DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR THE
AMARGOSA FARM ROAD
SOLAR ENERGY PROJECT
(NVN-084359)

Prepared for and under the Direction of:

Bureau of Land Management
Pahrump Field Office

Prepared by:

EPG, Inc.

On Behalf of:

Solar Millennium, LLC

March 19, 2010

BLM/NV/LV/ES-10/16+1793

BLM Mission Statement

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/NV/LV/ES-10/16+1793

DOI No. DES 10-10

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Southern Nevada District Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
http://www.blm.gov/nv/st/en/fo/lvfo.1.html

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In Reply Refer To:
N-084359
2800 (NVS3100)

Dear Reader:

Enclosed for your review and comment is the Draft Environmental Impact Statement (EIS) for the Amargosa Farm Road Solar Energy Project. The Bureau of Land Management (BLM) Pahrump Field Office has prepared this Draft EIS in response to a right-of-way application submitted by Solar Millennium, LLC to construct and operate two concentrated solar thermal parabolic trough power plant facilities on public lands in Amargosa Valley, approximately 80 miles northwest of Las Vegas, in Nye County, Nevada. Cooperating Agencies for this Draft EIS include the Department of Defense, Department of Energy, National Park Service, U.S. Army Corps of Engineers, Nevada Department of Wildlife, and Nye County. The purpose of this review is to assist BLM in its decision-making process with respect to the requested right-of-way.

This Draft EIS considers the expected environmental effects associated with granting the right-of-way on public land and subsequent construction and operation of the Amargosa Farm Road Solar Energy Project. The BLM is interested in your review and comment on the accuracy and completeness of this document. The Amargosa Farm Road Solar Energy Project Draft EIS will be available for review for 45 calendar days from the date the U.S. Environmental Protection Agency publishes the Notice of Availability in the Federal Register.

The BLM intends to hold four meetings in Nevada during the 45-day comment period, one each in Beatty, Amargosa Valley, Pahrump, and Las Vegas. The BLM will announce all public meeting times and locations at least 15 days in advance through public notices, media news releases, or mailings. In addition, information will be posted online at the BLM website: http://www.blm.gov/nv/st/en.html.

Comments should be sent to:

BLM, Pahrump Field Office
Attn: Greg Helseth
Renewable Energy Project Manager
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
FAX: 702.515.5023
Email: solar_millennium@blm.gov

A Final EIS will be prepared that will consider comments received during the 45-day comment period. For more information, please contact Greg Helseth at (702) 515–5173.

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Environmental Impact Statement
for the Amargosa Farm Road Solar Energy Project

(X) Draft **(   ) Final**

Lead Agency:	United States Department of the Interior Bureau of Land Management
Cooperating Agencies:	Department of Defense Department of Energy National Park Service United States Army Corps of Engineers Nevada Department of Wildlife Nye County
Counties Directly Affected:	Nye County, Nevada

Environmental Impact Statement Contact:

Greg Helseth
Renewable Energy Project Manager
4701 N. Torrey Pines Drive
Las Vegas, NV 89130

Date Draft EIS filed with U.S. Environmental Protection Agency: 3/12/10

Abstract

The Bureau of Land Management (BLM) Pahrump Field Office has prepared this Draft Environmental Impact Statement (EIS) in response to a right-of-way application submitted by Solar Millennium, LLC (Applicant or Proponent) to construct and operate the Amargosa Farm Road Solar Energy Project (Project). The proposed project would be located on BLM-administered lands, approximately 80 miles northwest of Las Vegas, in the Amargosa Valley in Nye County, Nevada. Some portions of the proposed project would be located on private lands including a 40-acre parcel at the south end of the project area and possibly the water pipeline(s) that would supply water to the project site.

The project area is located approximately five miles south of U.S. Highway 95 and five miles west of State Highway 373. The majority of the proposed project area would be located north of Amargosa Farm Road and east of Valley View Road. The Proponent's original right-of-way request of 7,670 acres was refined to include only 6,320 acres based on biological and cultural

resources surveys conducted during the spring 2009. Because the studies did not find anything of significance in the primary location, the secondary location was released. Project facilities would be located on approximately 4,350 acres and would include the solar fields, power blocks (one power block located in the center of each solar field), an office and maintenance building, parking area, lay-down area, stormwater detention basin, and switchyard.

The Proponent is evaluating two water supply options including: 1) purchase or lease of existing water rights and moving the point of diversion to the power block area; which would require construction of a new well(s); or 2) purchase or lease of existing water rights and construct a water pipeline from existing well(s) to the project site. Both options are currently being evaluated.

This Draft EIS considers the expected environmental effects associated with granting a right-of-way on public land and subsequent construction and operation of the proposed Project. The BLM will use the EIS, when rendering a decision about granting the requested right-of-way. The BLM's decision will be to grant, grant with modifications, or deny the request for right-of-way through public lands administered by the BLM. This Draft EIS satisfies the requirements of the National Environmental Policy Act, which mandates that federal agencies analyze the environmental consequences of major federal actions.

Official responsible for the environmental impact statement:

Patrick Putnam	3-3-2010 Date

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ACRONYMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
AC	alternating current
ACEC	Area of Critical Environmental Concern
afy	acre-feet per year
AHC	Average hourly controlled emissions
AHU	Average hourly uncontrolled emissions
APE	Area of Potential Effects
APVE	Area of potential visual effect
ARRA	American Recovery and Reinvestment Act
BAPC	Bureau of Air Pollution Control
BLM	Bureau of Land Management
BMP	Best Management Practices
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CO	carbon monoxide
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted decibel
DC	direct current
DCS	Distributed Control System
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DVRFS	Death Valley Regional Flow System
EDR	electrodialysis reversal
EIS	environmental impact statement
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
et seq.	"and the following"
FLPMA	Federal Land Policy and Management Act
FSC	Field Supervisor Controller
GIS	geographic information system
HCEs	heat collection elements

HTF	heat transfer fluid
IMV	Industrial Mineral Ventures
IPCC	Intergovernmental Panel on Climate Change
kV	kilovolt
LPG	Liquefied petroleum gas
MDC	Maximum daily controlled emissions
MDU	Maximum daily uncontrolled emissions
mg/L	milligrams per liter
MHC	Maximum hourly controlled emissions
MHU	Maximum hourly uncontrolled emissions
MMBtu/hr	British thermal units per hour
MTBA	Migratory Bird Treaty Act
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NBMG	Nevada Bureau of Mines and Geology
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resourees
NEIC	National Earthquake Information Center
NEPA	National Environmental Policy Act
NNHP	Nevada Natural Heritage Program
NO_2	nitrogen dioxide
NO2	nitric oxide
NOI	Notice of Intent
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRS	Nevada Revised Statutes
NV	Nevada State Route
NWR	National Wildlife Refuge
O_3	ozone
OSHA	Occupational Safety and Health Administration
OHV	off-highway vehicle

pb	lead
PFYC	Potential Fossil Yield Classification
PL	Public Law
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
POD	Plan of Development
PPE	personal protective equipment
PRPA	Paleontological Resources Preservation Act of 2009
PSD	Prevention of Significant Deterioration
PSPP	Palen Solar Power Plant
PV	photovoltaic
Qai	intermediate alluvial deposits
Qay	Young alluvial deposits
QTm	marl deposits
R	Range
RCRA	Resource Conservation and Recovery Act
RMP	Resource Management Plan
RO	reverse osmosis
ROD	Record of Decision
ROI	Region of Influence
ROS	Recreation Opportunity Spectrum
SCAs	solar collector assemblies
SEGS	solar energy generating system
SLRU	Sensitivity Level Rating Units
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SQRU	Scenic Quality Rating Units
SSG	solar steam generator
STG	steam turbine generator
SVP	Society of Vertebrate Paleontology
SWPPP	Stormwater Pollution Prevention Plan
T	Township
TDS	total dissolved solids
TMDL	Total Maximum Daily Loads
TWA	Time weighted average
USACE	U.S. Army Corps of Engineers

USC	United States Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compounds
VRIC	Visual Resource Inventory Classes
VRM	Visual Resource Management
WEG	wind erodibility group
WEI	wind erodibility index

EXECUTIVE SUMMARY

The Pahrump Field Offiee of the Bureau of Land Management (BLM) has prepared this Draft Environmental Impact Statement (EIS) in response to a right-of-way application submitted by Solar Millennium, LLC (Proponent) to construct and operate the Amargosa Farm Road Solar Energy Project (Project). The proposed Project includes the construction and operation of two 232-megawatt (MW) dry-cooled solar power plants equipped with thermal energy storage capability and associated ancillary linear facilities. Facilities located within the Project area would occupy approximately 4,350 acres and would include solar fields, power blocks, an office and maintenance building, parking area, lay-down area, switchyard, and a stormwater detention basin.

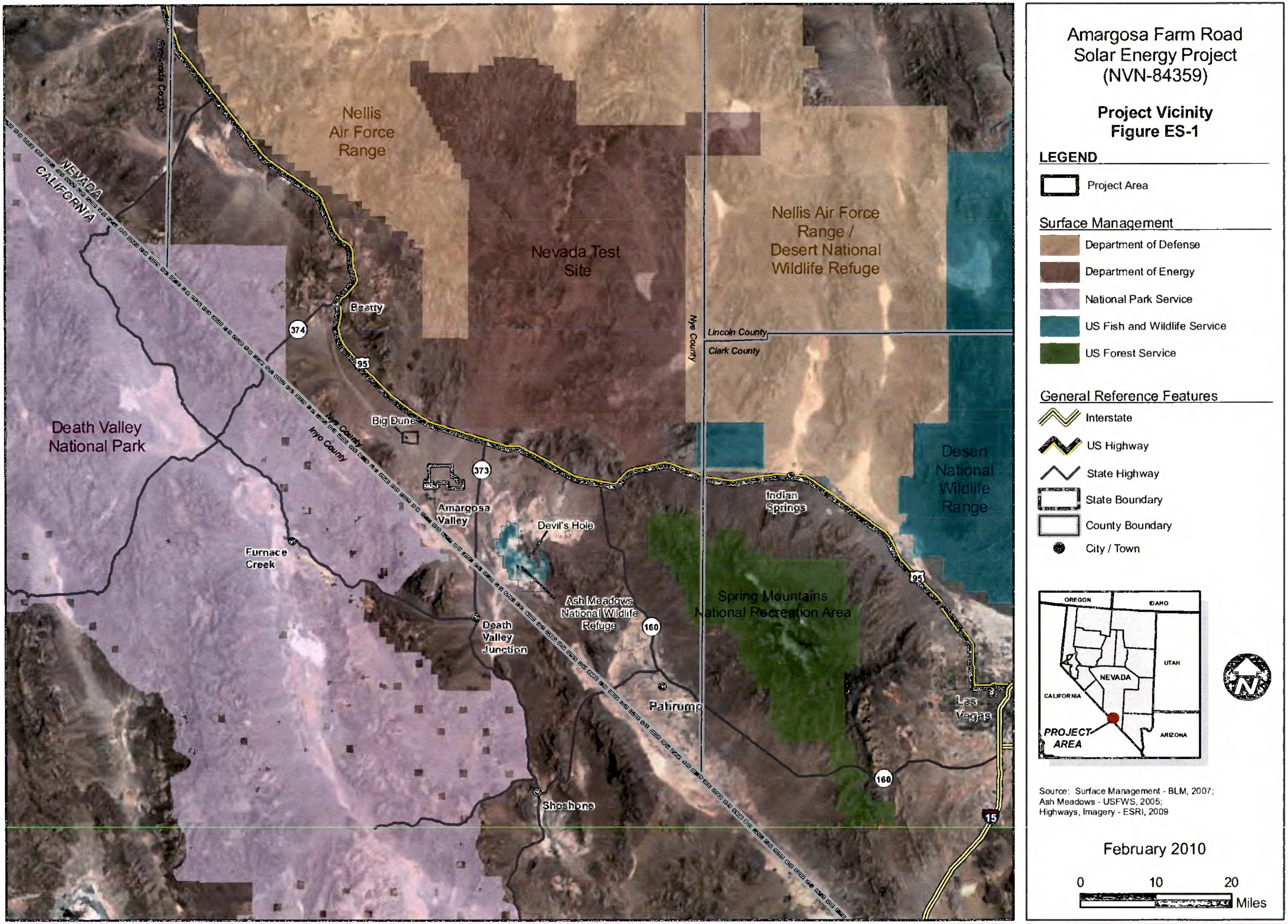
The proposed Project would utilize parabolic trough solar thermal technology to produce electrical power using steam turbine generators fed by solar steam generators. The main element of a parabolic trough power plant is the solar field. The solar field consists of numerous parallel rows of solar collectors, arranged on a north-south axis. The solar collectors follow the path of the sun from east to west during the day to keep the sun's rays continuously focused on a receiver tube. The reflectors consist of parabolic mirrors made from transparent, silver-coated glass, which eoncentrate the incident solar radiation 80-fold, focusing it onto the receiver tube in the solar collector. The receiver tube contains a heat transfer fluid (HTF), which is temperature-stable synthetic oil in a elosed circuit that can be heated to temperatures of up to 752 degrees Fahrenheit (°F) (400 degrees Celsius [°C]). Once heated, the oil is pumped to a centrally located power block, where it flows through a heat exchanger.

The remainder of the process is similar to the steam cycle used in conventional power plants. The steam produced by the heat exchanger is used to drive a turbine connected to a generator, which produces electricity to be fed into a substation. With solar thermal technology, the heat is stored (referred to as thermal storage) and used during periods of cloud cover and up to 4.5 hours after sundown.

At this time, it is anticipated the proposed Project would be built in two separate phases, with the construction of the first phase beginning in 2010, or immediately following issuance of the BLM right-of-way grant and other federal, state, and loeal permits and approvals. Project construction is expected to occur over a total of 39 months. The Proponent would phase construction so that the first power plant would be operational approximately 1 year before the second power plant becomes operational.

ES-1.1 Project Overview

The proposed Project is located on BLM-administered lands, approximately 80 miles northwest of Las Vegas, in the Amargosa Valley in Nye County, Nevada (Figure ES-1). Some portions of the proposed Project would be located on private property, including a 40-acre parcel south of Amargosa Farm Road, and the wells to be used to supply water to the proposed Project.



Amargosa Farm Road
Solar Energy Project
(NVN-84359)

Project Vicinity
Figure ES-1

Source: Surface Management - BLM, 2007;
Ash Meadows - USFWS, 2005;
Highways, Imagery - ESRI, 2009

February 2010

The Project area is located approximately 5 miles south of United States Highway 95 (US 95) and 3 miles west of Nevada State Route 373 (NV 373). The majority of the Project area would be located north of Amargosa Farm Road, and east of Valley View Road. The Proponent's initial application for a right-of-way and subsequent Plan of Development erroneously stated the area of the right-of-way to be 7,810 acres. The actual area, by legal description is 7,630 acres.

On August 6, 2009, the Proponent sent a letter to the BLM requesting a reduction in the acreage from 7,630 acres to 6,320 acres. The Proponent's decision to release a portion of the lands from further consideration was based upon refinement of the Project layout following surveys conducted in the spring of 2009. The lands released from further consideration are shown on Figure ES-2, Project Area. The legal description of BLM-administered lands requested under the Proponent's request is provided in Table ES-1-1.

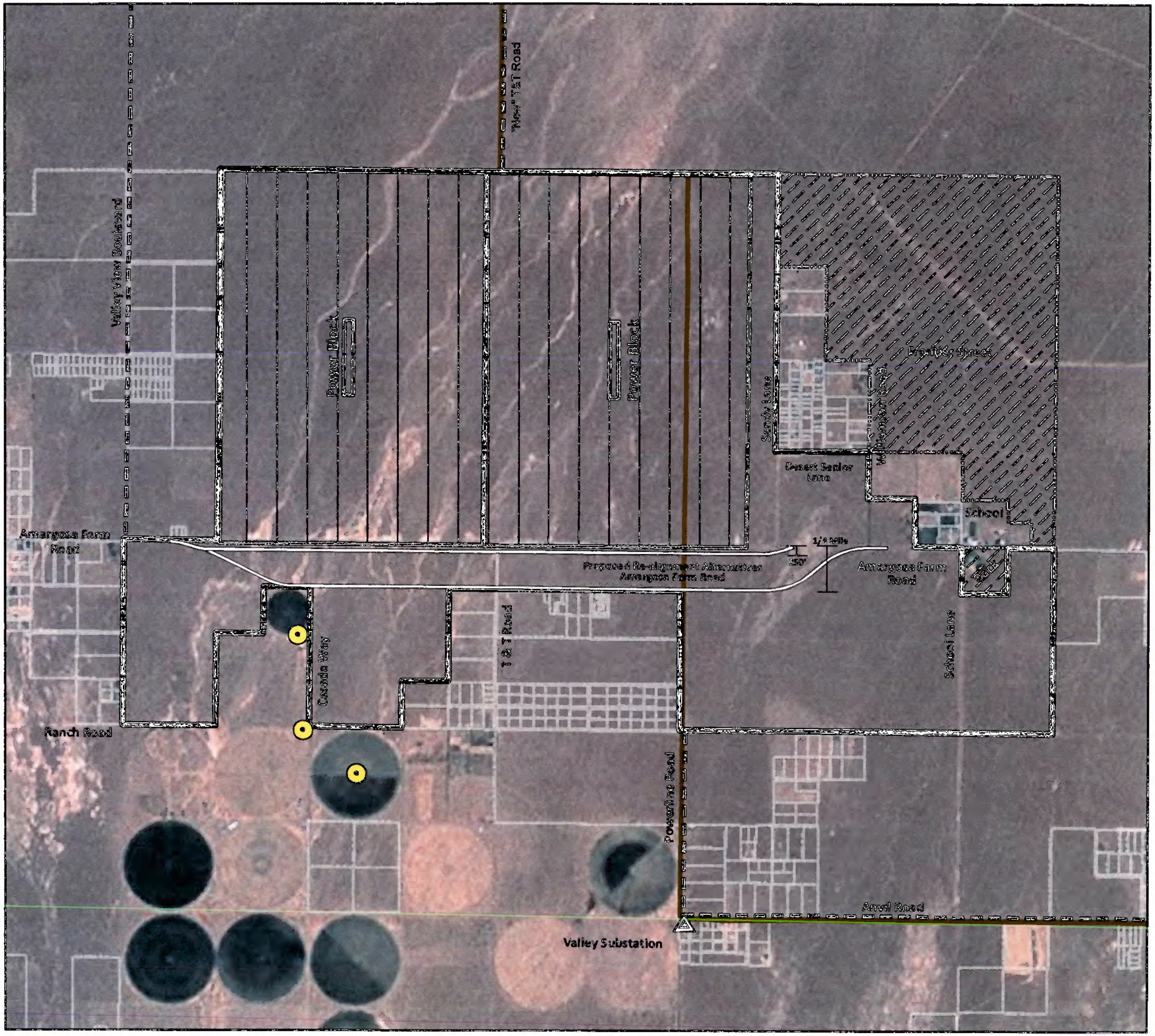
Table ES-1-1 Legal Description of Lands Requested Under Proponent's Right-of-Way Application

Township (T)	Range (R)	Section/Portion
T16 South	R48 East	Sec. 1 and 12 – all
T16 South	R48 East	Sec. 2, 11, 13, and 14 – Partial Section
T16 South	R49 East	Sec. 6, 7, and 17 – all
T16 South	R49 East	Sec. 5, 8, 9, 16 18 – Partial Section

ES-1.2 Purpose and Need for Action

ES-1.2.1 Bureau of Land Management Purpose and Need

The BLM's purpose and need for the Amargosa Farm Road Solar Energy Project is to respond to Solar Millennium's application under Title V of the Federal Land Policy Management Act (FLPMA) (43 U.S.C. § 1761) for a right-of-way grant to construct, operate and decommission a solar thermal generation facility and associated infrastructure in accordance with FLPMA, BLM right-of-way regulations, and other applicable federal laws. The BLM will decide whether to approve, approve with modification, or deny issuance of a right-of-way grant to Solar Millennium for the proposed Project. The decision the BLM will make is whether or not to grant the right-of-way, and if so, under what conditions.



Amargosa Farm Road Solar Energy Project (NVN-84359)

Project Area
Figure ES-2

LEGEND

- Initial Right-of-way Limits (November 2007)
- Revised Right-of-way Limits (August 2009)
- Lands Released from Consideration for Project
- Proposed Solar Field
- Alternative Access Road
- Proposed Project Well
- Existing Substation
- Existing Transmission Line (<230kV)
- Private Parcel Line

Note: The Power Block contains the steam turbine, salt storage tanks and other power generating equipment as described in the Plan of Development.

Source: Project Facilities - Solar Millennium, 2009; Wells - Nevada State Engineer, 2008; Substation, Transmission Line - Platts, 2009; Imagery - ESRI, 2009

February 2010

0 0.5 1 Miles

ES-1.2.2 Department of Energy Purpose and Need

The Proponent is pursuing economic stimulus funding for the proposed Project under the American Recovery and Reinvestment Act (ARRA) of 2009 Public Law (PL) 111-5 (the "Recovery Act"). If the Department of Energy (DOE) decides to enter into negotiation of a possible loan guarantee with the Proponent, pursuant to Title XVII of the Energy Policy Act (EPAct) of 2005 the DOE would likely become a cooperation agency in developing the Final EIS. If the DOE accepts the Proponent's application as suitable for funding, the DOE may adopt this EIS to meet their National Environmental Policy Act (NEPA) requirements in making a determination of funding. The purpose and need for action by DOE would be to comply with its mandate under the EPAct by selecting eligible projects that meet the goals of the EPAct.

ES-1.2.1 Proponent's Proposal

According to the 2005 Nevada Renewable Energy and Energy Conservation Task Force Annual Report to the Legislature and the Governor, Nevada utilities will need in excess of 3,000 gigawatt hours per year (GWh/yr) of new renewable energy generation capability over the next 10 years to meet the state's renewable energy needs (2005). The State of Nevada has established a Renewable Portfolio Standard that all public utilities must meet by investing in, and partnering with, commercial project developers to purchase renewable generated power, and participate in turnkey projects and/or co-development of renewable projects. This standard mandates that 12 percent of retail sales come from renewable resources by 2009-2010; 15 percent by 2011-2012; 18 percent by 2013-2014; 20 percent by 2015-2019; 22 percent by 2020-2024; and 25 percent by 2025. It is expected that at least 1,000 MW of new solar power will be required annually to meet this need.

Further, the Nevada Renewable Energy and Conservation Task Force has estimated that by increasing in-state renewable energy production to just 15 percent of the state's generation, over 5,000 new jobs could be created, with an average annual Gross State Product effect of $665 million through 2035 (2005).

In addition, solar energy projects that commence construction in 2010 can qualify for funding under the ARRA of 2009 P.L. 111-5 (the "Recovery Act"). The Recovery Act created Section 1705 authorizing a new program for rapid deployment of renewable energy projects and related manufacturing facilities, electric power transmission projects, and leading edge biofuels projects. The primary purposes of the Recovery Act are job preservation and creation, infrastructure investment, energy efficiency and science, assistance to the unemployed, and State and local fiscal stabilization. The Section 1705 Program is designed to address the current economic conditions of the nation, in part, through renewable energy, transmission and leading edge biofuels projects. The proposed Project is one of several solar projects in the western United States that are considered by the federal government to be potentially eligible for ARRA funding. A loan guarantee would reduce the cost financing and therefore the gross project cost over the life of the Project.

The Proponent's objectives and purpose of the proposed Project are to:

- Develop a utility-scale parabolic trough solar thermal energy facility that optimizes power generation efficiency and provides energy at a reasonable and competitive cost.
- Construct and operate an environmentally compatible, economically sound, and operationally reliable solar power generation facility that will contribute approximately one million MW hours of clean, renewable solar energy per year to meet renewable energy goals.
- Locate the Project in an area with high solar insolation (i.e., high intensity of solar energy).
- Minimize environmental impacts, infrastructure needs, and costs by locating the plant near existing infrastructure, such as a transmission line, a substation, an adequate water supply, and highways/access roads, and by using designated corridors to the maximum extent possible.
- Develop a power-generation facility with the flexibility to continue producing electricity when the solar resource is not optimal (i.e., during cloud cover and early evening hours) to better match the load demands of utility offtakers.
- Develop a solar thermal energy facility that will qualify for, and benefit from, the ARRA Grant Program.
- Support the economy of southern Nevada by helping to ensure an adequate supply of renewable electrieal energy, while creating additional tax revenues, employment, and expenditures in local businesses.

As of December 2009, the proposed Project was one of 31 renewable energy project that have met the required milestones to remain on BLM's fast-track list for expediting processing. Fast-track projects are those where the companies involved have demonstrated to the BLM that they have made sufficient progress to formally start the environmental review and public participation process. These projects are advanced enough in the permitting process that they could potentially be cleared for approval by December 2010, thus making them eligible for economic stimulus funding under ARRA.

ES-1.3 Public Participation and Agency Consultation

ES-1.3.1 Public Participation

Public scoping is an integral part of NEPA planning process. It provides "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a Proposed Action" (40 CFR 1501.7). Initiation of the EIS process and the public scoping meetings for the proposed Project were announced through the Federal Register Notice of Intent (NOI), published on July 13, 2009 (Volume 74, Number 132, Page 33458), which marked the beginning of the public scoping period for the Project EIS.

The scoping period, required to be a minimum of 30 days, was announced as ending on August 12, 2009. Public scoping meetings were not conducted within this time period; therefore, a second notice was published in the Federal Register on September 17, 2009 (Volume 74, Number 179, Page 47820), reopening public scoping. This reopened scoping period was announced as ending on October 19, 2009.

Four scoping meetings were held from August 17 through August 24, 2009, and one information meeting, following the reopened scoping period, was held on September 22, 2009. During the public scoping period, a total of 151 comment documents were received, with a total of 1,175 comments provided. A comment document is defined as a method of response recorded as part of a public scoping transcript, email, fax, letter, or comment form. Because some documents had more than one comment, the total number of comments is greater than the number of respondents or individuals who submitted comments. A summary of comments received is provided in Chapter 1.9. Copies of the individual comments received during the scoping period are available for review at the BLM Pahrump Field Office.

ES-1.3.2 Agency and Tribal Consultation

Federal and state agencies were contacted individually to gather input for the EIS. Other resources management agencies at the federal and state levels were consulted to identify common concerns related to the Proposed Action or Alternatives. Cooperating agencies on this EIS include the Department of Defense (DOD), DOE, National Park Service (NPS), United States Army Corps of Engineers (USACE), Nevada Department of Wildlife (NDOW), and Nye County. Consultations with federal, state, and local resource management and regulatory agencies, as well as interested Tribal governments are ongoing.

A Biological Assessment has been prepared for the Proposed Action and will be submitted to the U.S. Fish and Wildlife Service (USFWS) as required by Section 7 of the Endangered Species Act of 1973. A species list was requested from the USFWS which identified flora and fauna listed as threatened, endangered, or candidate species that occur and have the potential to occur within the Project area and its vicinity. At the request of the USFWS, rare plant and Desert Tortoise surveys have been conducted within the Project area. Consultation with the USFWS will be triggered once the Biological Assessment has been submitted.

The BLM conducts consultation and coordination with American Indian Tribal governments for proposed projects that may affect their ancestral lands. On June 17, 2009 the BLM distributed formal consultation letters to the following groups:

- Pahrump Paiute Tribe
- Las Vegas Paiute Tribe
- Chemehuevi Indian Tribe
- Colorado River Indian Tribes
- Timbisha Shoshone Tribes

The notification letter informed them of six separate renewable energy projects being proposed in the Pahrump and Amargosa Valleys of Nye County, Nevada, including the proposed Project. The tribes were invited to provide input on any potential impacts to any culturally significant

areas within the proposed solar project areas, including the proposed Amargosa Farm Road Project area. The Tribes were also informed of when scoping meetings were to occur if they wanted to make any project comments. A field visit with the Timbisha Shoshone Tribe was conducted on September 17, 2009. No Tribal comments opposing the Project's proposed action have been received by the BLM.

ES-1.4 Proposed Action and Alternatives

ES-1.4.1 Proposed Action – Dry-Cooled Alternative

The Proposed Action alternative includes the construction and operation of a two-unit dry-cooled parabolic trough solar thermal power plant, with each unit having a net output of 232 MW. The plant will consist of a conventional steam Rankine-cycle power block, a parabolic trough solar field, a HTF and steam generation system, a nitrate salt thermal energy storage system, as well as a variety of ancillary facilities (sometimes referred to collectively as "balance-of-plant"), such as conventional water treatment, electrical switchgear, administration, warehouse, and maintenance facilities. The electric output of the plant will be provided entirely by solar energy. No electricity will be generated by the use of fossil fuel.

The Proponent's original right-of-way request of 7,630 acres was refined to include only 6,320 acres. Project facilities would only be located on approximately 4,350 acres and would include the solar fields, power blocks, an office and maintenance building, parking area, lay-down area, stormwater detention basin, and switchyard.

As shown on Figure ES-2, the solar field will occupy the majority of the Project footprint. The final layout will be determined based on engineering design and in consideration of resource constraints and opportunities. General facility dimensions are listed in Table ES-1-2.

A land survey of the proposed right-of-way is being performed to determine the final boundary and extent of the Project area. A topographic survey was performed to obtain one-foot contours for final engineering design for grading and drainage-related requirements. A preliminary geotechnical study of the Project site will be conducted to evaluate general subsurface conditions, seismicity, and other geological hazards and to provide recommendations for design and construction of the foundations for Project structures.

All plant facilities will be designed, constructed, and operated in accordance with applicable laws, ordinances, regulations, and standards. All generating facilities will be located within the facility fence line.

Table ES-1-2 Preliminary Facility Dimensions for Proposed Alternative and Wet-Cooled Alternative			
Project Component	**Approximate Dimensions / Acreage**	**Proposed Alternative (Dry-Cooled)**	**Wet-Cooled Alternative**
Solar Fields	Two fields, Approximately 7,800 feet east-west by 11,000 feet north-south. Each field has a collector aperture area of approximately 2 million square meters. 1,970 acres	X	X
Power Blocks	One power block located in the center of each solar field; approximately 2,500 feet x 490 feet; 144 feet high for a dry-cooled tower, or 55 feet high for a wet-cooled tower (28 acres each)	X	X
Switchyard	400 feet x 400 feet (3.7 acres)	X	X
Assembly Hall/Maintenance Building	330 feet x 130 feet x 35 feet (1 acre)	X	X
Office	100 feet x 30 feet x 12 feet (.06 acres)	X	X
Parking Area	250 feet x 100 feet (0.5 acres)	X	X
Stormwater Detention Basin	1,200 feet x 1,200 feet (33 acres) – providing 122-acre-feet of storage assuming 4-foot-deep basin)	X	X
Evaporation Pond(s)	Up to four ponds; 800 feet x 1,250 feet approximately 46 acres		X
Bioremediation Area	400 feet x 800 feet (7.3 acres)	X	X

ES-1.4.2 Wet-Cooled Alternative

Under the wet-cooled alternative, the Proponent would construct and operate two 242 MW solar thermal power plants and ancillary facilities. Construction and operation of a wet-cooled project would be similar to a dry-cooled plant. Plant components and layout are similar under both the wet- and dry-cooled alternatives; the primary differences being the amount of water used for plant operations, the need for cooling towers for heat rejection from the steam cycle (see section 2.5.3.4), and the need for evaporation ponds. Table 2-2 lists the plant components for both the wet- and dry-cooled alternatives.

Water use in a wet-cooled plant would include water needed for the cooling tower to cool the steam cycle; water for solar collector mirror washing; makeup for the SSG feedwater; dust control, potable water and fire protection. The average total annual water usage for the wet-cooled alternative is estimated to be approximately 4,600 acre-feet per year (afy). Under the wet-cooled alternative, the 3 wells identified for use in under the dry-cooled alternative, would

supply a portion of the water required for operations. However, additional water supplies would be required under the wet-cooled alternative. The source of this additional water would be dependent on the availability of other water rights available for lease or sale in the Amargosa Desert Hydrographic Basin.

The wet-cooling alternative has performance advantages over the dry-cooling alternative offering approximately 11 MW greater electrical output during peak summer ambient temperature conditions. The performance of the wet-cooled alternative is enhanced because wet-cooling relies primarily on evaporative eooling to remove heat from the circulating water. In contrast, a dry-cooled alternative uses convective heat transfer, which operates similar to a car's radiator. In the dry-cooled alternative, an air cooled condenser using a large array of fans that force air over finned tube heat exchangers cools the steam turbine-generator exhaust steam. The disadvantages of dry-cooling are higher capital costs, higher auxiliary operating power requirements and an overall lower plant performance, especially on hot days, when the peak power is needed most. A dry-cooled plant provides about 5 percent less electric energy on an annual basis than a wet-cooled plant, because of reduced performance on hot summer days. The electricity cost for a dry-cooled plant is approximately 6 to 9 percent higher than for a wet-cooled plant. Thus dry-cooling of a trough plant minimizes water use, but at a 6 to 9 percent cost penalty.

ES-1.4.3 No Action Alternative

NEPA regulations require that EIS alternative analyses "include the alternative of no action" (40 CFR 1502.14[d]). The No Action Alternative provides a useful baseline for comparison of the environmental effects of the other alternatives. For this analysis, no action means that the BLM would reject the Applicant's proposal and the right-of-way as requested would not be approved or authorized.

Because the Project facilities would not exist, potential adverse environmental effects would not occur. However, it is important to also note that any beneficial effects such as reduced fossil fuel use would also not occur.

ES-1.4.4 Other Alternatives Considered But Not Evaluated in Detail

In accordance with Title 40 CFR Section 1502.14, and consistent with guidance in BLM's NEPA Handbook, alternatives were not carried forward for further analysis if the alternative:

- is ineffective (it would not respond to the BLM's purpose and need).
- is technically or economically infeasible.
- is inconsistent with the basic policy objectives of the Las Vegas Resource Management Plan/EIS.
- implementation is remote or speculative.
- is substantially similar in design to an alternative that is analyzed.

- would have substantially similar effects to an alternative that is analyzed.

ES-1.4.4.1 Alternative Sites

As part of its siting process, the Proponent used a refined set of criteria to screen, identify, and prioritize potential land sites for eventual solar development. Criteria include all aspects of feasibility including physical characteristics of the site, environmental considerations, as well as economic factors. Each of these criteria was applied during the screening phase for the proposed Project, which led to the selection of the current site.

These criteria included:

- **Solar Resource** – The site needs to be located where high solar insolation is available to maximize the plant's output and allow efficient utilization of the land area affected by project development. For a project to be economically viable, solar insolation levels of greater than 7 kilowatt-hours per square meter per day (kWh/m^2/day) are desirable.

- **Size and Shape** – The site must be large enough (at least 4,000 contiguous acres) and of adequate proportions to include two 232 MW parabolic trough solar thermal plants. The shape of the site should also support an efficient and cost-effective layout of the project facilities.

- **Slope** – The site should be relatively flat, with a slope of 2 percent or less, to minimize the need for extensive grading and a large volume of cut and fill.

- **Environmental sensitivity** – The site should not be highly pristine or biologically sensitive (e.g. not within a designated wilderness area or Area of Critical Environmental Concern).

- **Availability of Infrastructure and Water** – To minimize cost and potential environmental impacts, the site should be located where water resources are available and interconnection to an existing transmission system is possible without the construction of lengthy transmission lines. In addition, the site should be in reasonable proximity to suitable transportation infrastructure to allow easier access during both construction and operation without creating the need for additional road construction.

- **Site Control** – The land must be available for sale or lease/right-of-way, at a reasonable cost and be free of conflicting encumbrances.

- **Labor Availability** – The site should be close enough to areas with large construction labor pools so as to maximize the number of construction workers within daily commuting range.

- **Economic Viability** – The Project must be economically viable and competitive with other renewable technology projects, including wind, geothermal, and other solar projects. To be viable, the site should be located on property currently available at a

reasonable cost, be as close as possible to transmission and transportation infrastructure, and have a high solar resource value.

The selected Project site is located in an area containing excellent solar resource and is large enough to accommodate two 232 MW plants in an optimal layout. In addition, the Project site is relatively flat; is not located in any wildlife management or conservation areas; has access to transmission infrastructure and water resources; and was available for an application for a right-of-way from the BLM. Finally, the Project site allows for access to skilled labor and other industrial infrastructure from nearby Pahrump and Las Vegas.

Three alternative sites were considered. The three sites include a site southeast of Pahrump "Sandy", a site a few miles south of the proposed Project along Anvil Road in Amargosa Valley "Anvil Road", and a site near the Beatty Airport "Beatty". Right-of-way applications were filed for each of these sites in 2007 and 2008. The right-of-way applications for each of these sites were ultimately withdrawn after the Proponent conducted due diligence and preliminary studies on each site and determined the alternative sites did not meet the above criteria.

The Sandy site consisted of approximately 8,000 acres in Pahrump Valley approximately 20 miles southeast of Pahrump. Due to the slope of the site, as well as the existence of sensitive vegetation types, conflicting encumbrances, and water availability, the site was not a viable option.

The Anvil Road site consisted of approximately 1,000 acres, located a few miles south of the selected Project site. The site was flat and had good access to transmission infrastructure but was too small to accommodate one 232 MW plant, let alone two of them. The Proponent explored acquiring additional land surrounding the site but determined that the acquisition of sufficient lands was not economically viable. This, combined with the size and existing encumbrances on the site, made the site not viable.

The Beatty site consisted of approximately 2,500 acres located adjacent to the Beatty Airport (approximately 35 miles north of the Project site). It was flat and had good solar resource, however, the site was too small for two 232 MW plants, had existing encumbrances and the Proponent determined that access to transmission and water would be more difficult and costly than the Project site that was ultimately selected.

Table ES-1-3 summarizes the weaknesses of each of the alternative sites.

Table ES-1-3 Alternative Sites Considered

Alternative Site	Solar Resources	Size and Shape	Slope	Environmental Sensitivity	Availability of Infrastructure	Site Control
Sandy			x	x		x
Anvil Road		x				x
Beatty		x			x	

Various other location in Nye County were also investigated, but were not ultimately pursued as they failed to meet the Proponent's baseline screening criteria.

The Proponent also considered the alternative of developing the proposed Project as a single 232 MW plant. Generally, building one plant would have fewer environmental impacts. However, given the infrastructure requirements associated with building a single plant, building two plants allows for economies of scale and reduces the infrastructure impacts, including transmission access, and water development. In addition, a single 232 MW plant would not be as effective in meeting the Project objective of supporting attainment of renewable energy mandates and objectives. For these reasons, the development of a smaller project was rejected.

During the scoping period, several comments were received requesting the Proponent move the Project site further north; at a distance of at least 0.5 to 2 miles away from existing residential or public buildings. The BLM land immediately north of the Project area has a pending solar energy development right-of-way application on file with the BLM Pahrump Field Office (Cogentrix - NVN-083150). The Proponent filed an overlapping or "second-in-line" right-of-way application on these lands (NVN-087366); however, subsequent discussions between Cogentrix and BLM staff indicate Cogentrix intends to develop a solar energy project at this location within the next 2 to 3 years. Thereby, it is unlikely that the Proponent's overlapping application could be processed.

ES-1.4.4.2 Alternative Solar Technology

The Proponent has requested a right-of-way to construct and operate a dry-cooled, solar thermal parabolic trough project. Solar thermal parabolic trough technology has a history of successful operation in the United States. The Solar Energy Generating Systems (SEGS), located in California's Mojave Desert, is the largest solar energy generating facility in the world. It consists of nine solar power plants with an installed capacity of 354 MW installed capacity that have operated successfully over the past 30 years. Although other solar thermal technologies are under active development, none of these technologies have the construction and operating experience of the parabolic trough technology. Building upon this experience base significantly reduces much of the construction and operational risk associated with a project of this magnitude. In addition, the Proponent has significant experience and expertise in developing and constructing parabolic trough plants. The Proponent is a wholly owned subsidiary of Solar Trust of America, LLC, a joint venture between Solar Millennium AG and Ferrostaal AG. Solar Millennium AG is an international developer and supplier of parabolic trough collector technology used in powering solar thermal power plants. Solar Millennium AG developed and designed the first parabolic trough power plants, Andasol 1-3, in Spain. The Andasol 1 plant began operating in December 2008, the Andasol 2 plant is currently in the commissioning phase, and the Andasol 3 plant, is currently under construction. When the entire Andasol complex is completed in 2011, it is expected to generate enough electricity to serve 150,000 Spanish households or about 600,000 people. Ferrostaal AG is a worldwide provider of industrial services and plant construction and engineering.

Although all of the SEGS and Andasol projects are wet-cooled plants, a dry-cooled alternative is the Proponent's preferred alternative. Dry-cooled technology has been used successfully on large

thermal generating plants in the United States for almost 30 years dating back to its use on the 330 MW, coal-fired, Wyodak power plant in Wyoming. The largest dry-cooled power plant installation in the world, the 4,000 MW coal-fired Matimba plant in South Africa, has successfully operated for over 10 years. Dry-cooled technology was proposed because it is a well proven technology for this scale of power generation in desert environments.

Construction and operation of a solar thermal parabolic trough plant using wet-cooling is an alternative that is considered in this Draft EIS. Wet-cooling technology has performance advantages in comparison to dry-cooling. Performance is enhanced because wet-cooling relies primarily on evaporation to remove heat from the circulating water, while dry-cooling technology uses an air cooled condenser that cools the steam turbine-generator exhaust steam using a large array of fans that foree air over finned tube heat exchangers. The disadvantages of dry-cooling are higher capital costs, higher auxiliary operating power requirements and an overall lower plant performance, especially on hot days, when the peak power is needed most. A dry-cooled plant provides approximately 5 percent less electric energy on an annual basis than a wet-cooled plant, because of reduced performance on hot summer days. The electricity cost for a dry-cooled plant is approximately 6 to 9 percent higher than for a wet-cooled plant. Thus dry-cooling of a trough plant minimizes water use, but at a 6 to 9 percent cost penalty.

ES-1.4.5 Agency-Preferred Alternative

The BLM is awaiting public input before identifying a preferred alternative. The environmental consequences of the Proposed Action and Alternatives are summarized and compared in Table ES-1-4 below.

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action – Dry-Cooled Alternative	Wet-Cooled Alternative	No Action Alternative
Air Quality and Climate – Sections 3.1 and 4.1		
Direct effects on air quality would occur from earthmoving activity during construction (fugitive dust, PM_{10} and $PM_{2.5}$) and tailpipe emissions from heavy construction equipment and worker vehicles (PM, NOx, SO_2, CO, and VOC). The Proponent would comply with Federal and State air quality standards. Particulate emissions during construction would be temporary and mitigated through adherence to the recommended mitigation measures. Operation of the solar power plant would not result in increases of Potential for Significant Deterioration emission levels in the regional area. The facility is not considered a major stationary source with potential to cause significant air quality impacts. The Project's operation would not cause new violations of any NO_2, SO_2, $PM_{2.5}$ or CO ambient air quality standards.	Impacts to air quality from construction and operation of a wet-cooled solar plant would be similar to the impacts described below for the Proposed Action (dry-cooled alternative). The primary differences is the additional PM_{10} and $PM_{2.5}$ emissions from the cooling tower associated with a wet-cooled plant due to solids in the entrained moisture in the cooling tower drift.	Under the No Action Alternative, there would be no short-term construction-related exhaust or fugitive dust impacts. No impacts to air quality would occur under the No Action Alternative. The No Action Alternative, therefore, would not contribute to the State of Nevada's established Renewable Portfolio Standard goals.
Geological Hazards and Mineral Resources – Sections 3.2 and 4.2		
The Proposed Action would not result in impacts to geological resources. However, seismic activity and ground subsidence in the region could potentially impact structures constructed and operated under the Proposed Action. All project components and facilities would be constructed in accordance with applicable regulations, engineering protocols, and safety standards to minimize potential impacts from seismic activity. The Proposed Action would not result in impacts to mineral resources, as no active claims, mines, or quarries are present within the Project area.	Impacts to geological hazards and mineral resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).	Under the No Action Alternative, no Project-related impacts to geological hazards or mineral resources would occur.
Soils – Sections 3.3 and 4.3		
Direct impacts to soil resources associated with construction activities under the Proposed Action include increased water- and wind-induced soil erosion from within the Project area. No soils capable of supporting Prime Farmland would be impacted by the Proposed	Impacts to soils from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).	Under the No Action Alternative, no Project-related impacts to soil resources would occur.

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action – Dry-Cooled Alternative	Wet-Cooled Alternative	No Action Alternative
Action. There would be no impacts to soil resources as a result of operation or maintenance of the components or facilities under the Proposed Action. Site-specific best management practices to minimize soil erosion and sedimentation would be implemented during construction and operations. The selected erosion and sediment control best management practices and environmental protection measures would be based on the type of disturbance expected, soil type, and the location of the site relative to sensitive resources.		
Water Resources – Sections 3.4 and 4.4		
Under the Proposed Action (dry-cooled alternative), the demand for operational water would be 400 acre-feet per year (afy). The proposed source of the water is three existing wells, currently producing approximately 1300 afy. With either a wet- or dry-cooled option, water rights will be acquired from an existing water right owner(s), and converted from irrigation use to industrial use. The section of the Fortymile Wash that traverses the Project area will be rechanneled and designed to intercept the 100-year storm event and convey the concentrated flow to historic discharge locations south of the Project site. The Proponent is coordinating these activities with the BLM, Nye County, and the USACE. Potential impacts to water resources during construction would be primarily associated with surface disturbing activities, but could also be a result of accidental spills and handling and storage of hazardous chemicals. Mitigation measures are proposed to prevent spills of chemicals, as well as to respond to spills should they occur.	Under this alternative, the demand for water would be 4,600 afy, which is substantially more than that required for the Proposed Action. It is assumed that the water that could be acquired for the wet-cooled option would have been used on an annual basis by the current water rights owner(s) at the same volume. New wells would be drilled on-site and changes in the points of diversion, place of use and manner of use would be required to be approved by the Nevada Division of Water Resources. Water acquisitions would be required to comply with Nevada State Engineer Ruling No. 1197 and any other Nevada state regulations and policies. The reduction in return flow from irrigation would be increased under this alternative, but would still be substantially less than the volume modeled. Construction-related impacts on water resources for this alternative would be the same as the Proposed Action (dry-cooled alternative).	Under the No Action Alternative, no Project-related impacts to water resources would occur.
Noise – Sections 3.5 and 4.5		
Throughout the construction of the proposed Project, temporary noise impacts are expected to briefly radiate within the defined boundaries	Impacts to noise levels from construction and operation of a wet-cooled solar plant may be similar to	Under the No Action Alternative, no Project-related

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action – Dry-Cooled Alternative	Wet-Cooled Alternative	No Action Alternative
of the project site. Under Environmental Protection Agency (EPA) guidelines for outdoor noise impacts to residential property lines, the noise impacts are considered to be less than significant and no mitigation will be required for the temporary construction operations. Operational activities of the Proposed Action were evaluated to determine the worst-case daily operational noise impacts. Under EPA noise threshold guidelines, the impacts were found to be less than significant and require no mitigation. Employees working within the operational areas may be exposed to areas considered as a sensitive noise receptor location. Under Occupational Safety and Health Administration (OSHA) Standards the impact of worst-case calculated noise exposure levels the impacts is considered less than significant.	the impacts described for the Proposed Action (dry-cooled alternative). The noise producing mechanical equipment is situated at a great height in a wet-cooled solar plant and, as such, may result in slight decreases in operational noise as compared to the dry-cooled alternative.	impacts to noise levels would occur.
Biological Resources – Sections 3.6 and 4.6		
VEGETATION RESOURCES: Potential direct impacts to vegetation resources associated with construction activities would include clearing and grubbing of approximately 4,350 acres of creosote bush-dominated native vegetation for the duration of the proposed Project life, and the potential to introduce or spread non-native weeds already present in the Project area or brought in by contaminated vehicles. No potential habitats for federally listed threatened or endangered plant species occur within the Project area; however, two state protected cacti species are present and would need to be salvaged in accordance with NRS 527.060-120. Indirect impacts to vegetation resources include soil compaction, changes to soil structure by use of dust suppression, spread of non-native weeds already present in the Project area and brought in by contaminated vehicles, and changes in the distribution of precipitation falling on the solar fields.	VEGETATION RESOURCES: Impacts to vegetation from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative) with the addition of the following impacts. The open evaporation ponds would be an attractant to many species of waterfowl, migratory birds, and foraging bats. The increased use of the ponds by wildlife would increase the potential of harm to those individuals. Further, increased use of the ponds by birds would increase the presence of raptors, increasing predation on those species at the ponds. The raptors would utilize the newly constructed structures as perch sites for hunting. Similar to the dry-cooled alternative, there would be no new groundwater pumping under the wet-cooled alternative. Water for Project construction and	Under the No Action Alternative, no Project-related impacts to biological resources would occur.

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action – Dry-Cooled Alternative	**Wet-Cooled Alternative**	**No Action Alternative**
WILDLIFE RESOURCES: Direct impacts on wildlife resources can result from ground disturbance caused by construction-related activities, which can impact wildlife habitat by removing vegetation, altering plant composition or structure (e.g. non-native invasive species replacing native species), causing fragmentation, loss of connectivity for wildlife, increased predation, and altering soil characteristics. Pre-construction clearance surveys would be conducted to ensure that activities associated with the construction and operation of the Project would not cause mortality to individuals. Mortality could also occur from collisions with equipment and vehicles. Predation could increase as construction displaces wildlife from protected cover to uncovered habitat. Removal of vegetation, alteration of Fortymile Wash, and placement of fencing around parameter of the solar fields, could impede travel opportunities for wildlife. The Project area contains low quality, but suitable habitat for Desert Tortoise. Four old Class IV burrows were located within the Project area. Efforts will be made to ensure that the area is clear of any active burrows and all live tortoises prior to any construction being conducted. Direct impacts on migratory birds could result from ground disturbance during construction. Construction activities may impact suitable habitat for nesting and burrowing birds including Burrowing Owl, a BLM Sensitive species and a Nevada animal species considered to be at risk in all counties in Nevada. Old burrowing Owl burrows were found in the Project area. For other nesting bird species, direct impacts could include eliminating potential nesting habitat and loss of individuals. The Migratory Bird Treaty Act (MBTA) applies to species that would be impacted during the construction phase of the Project. Other sensitive species observed within the Project area include Prairie Falcon and LeConte's Thrasher. There would be direct impacts to LeConte's Thrasher by eliminating suitable nesting habitat. Direct impacts on Desert Tortoise can result from loss of tortoise habitat;	operations, would be obtained from existing water rights and converted to industrial use. WILDLIFE RESOURCES: Impacts to wildlife resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative) with the addition of the following potential impacts. The wet-cooled alternative would include two evaporation ponds that would collect blowdown water from the cooling towers. There is potential for wildlife threats posed by the evaporation ponds. First, creation of a new water source to an area where water is scarce could attract ravens to the Project, potentially increasing predation rates on juvenile desert tortoise in adjacent habitat. Second, waterfowl, shorebirds, and other resident or migratory birds could be harmed if they drink evaporation pond water or eat aquatic invertebrates (or their terrestrial emergent's) inhabiting evaporation pond water. Similar to the dry-cooled alternative, there would be no new groundwater pumping under the wet-cooled alternative. Water for Project construction and operations, would be obtained from existing water rights and converted to industrial use. New wells would be drilled on-site and changes in the points of diversion, place of use and manner of use would be required to be approved by the Nevada Division of Water Resources.	

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action – Dry-Cooled Alternative	**Wet-Cooled Alternative**	**No Action Alternative**
including loss of old burrow sites, located in the northwest quarter of the Project area. Permanent loss of native vegetation would directly impact at least 12 snake and lizard species that were found in the Project area. Two such species include, Desert Iguana, included on the Nevada Natural Heritage Program Animal Watch List, and Nevada Shovel-nosed Snake, included as a conservation priority species in Nevada. Under the Proposed Action, the Proponent would purchase or lease existing water rights and convert the type of water use from current agricultural use to industrial use. As such, the proposed Project would not increase pumping in the hydrographic basin. Using the best available model and a conservative assumption that Project pumping would add to, rather than replace existing pumping impacts to water levels in Devils Hole were determined to be negligible. Therefore, indirect impacts from groundwater pumping to Devils Hole and associated sensitive wildlife species are also presumed to be negligible.		
Historic and Cultural Resources – Sections 3.7 and 4.7		
Sixteen cultural resource sites were identified within the Area of Potential Effects of the Proposed Action. Only one site has been determined eligible for listing on the National Register of Historic Places (NRHP) under Criterion D. Direct effects to this site could occur as a result of ground disturbing activities associated with the construction of the proposed Project. An Historic Properties Treatment Plan describing the mitigation measures that would be employed to resolve any adverse effect to the one NRHP eligible site would be prepared. It is anticipated that any potential direct impacts from Project construction would be fully mitigated through data recovery. If previously unidentified cultural resources, human remains, or funerary items are discovered during Project activities, the procedures outlined in the BLM Nevada State Protocol Agreement would be implemented.	Impacts to cultural resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).	Under the No Action Alternative, no Project-related impacts to cultural resources would occur.

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action – Dry-Cooled Alternative	**Wet-Cooled Alternative**	**No Action Alternative**
Paleontological Resources – Sections 3.8 and 4.8		
No previously discovered paleontological localities have been identified within the Project area. However, a geological unit with an undetermined potential for containing significant paleontological resources was identified within the Project area. The probability is low that construction activities under the Proposed Action may result in the exposure of paleontological resources in this geological unit, which consists of marl deposits that represent Pleistocene spring deposits. There would be no impacts to paleontological resources as a result of operation or maintenance of the components or facilities under the Proposed Action.	Impacts to paleontological resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).	Under the No Action Alternative, no Project-related impacts to paleontological resources would occur.
Socioeconomic Resources – Sections 3.9 and 4.9		
Construction of the proposed Project would last 39 months. Construction is expected to directly create an average of about 650 annual full-time employment (FTEs) over 39 months, with a peak monthly employment of about 1,300 FTEs. This direct employment will create both indirect and induced secondary employment in the regional area. For all projects in the region, temporary housing facilities would be needed and the added population during construction could place a burden on local social and public services. The construction payroll has been estimated at approximately $68.8 million annually. Capital expenditures and local spending on construction materials and equipment within the ROI are estimated to total approximately $47.1 million annually. During construction, the proposed Project would generate up to $34 million for Nye County in property taxes, and pay approximately $45 million in sales tax to the State of Nevada for the Local School Support Tax. During operation, it is expected that the annual purchases for materials supplies, equipment, and services within the ROI would total approximately $6.0 million. For example, if all purchases are made within Nye County, which has a current tax rate of 7.1 percent, these	Socioeconomic effects under the wet-cooled alternative would be the same as the Proposed Action (dry-cooled alternative).	Under the No Action Alternative, the right-of-way would not be granted. However, the land on which the Project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project. The beneficial impact on the regional economy from construction and operation of the proposed Project would not occur.

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action – Dry-Cooled Alternative	**Wet-Cooled Alternative**	**No Action Alternative**
expenditures would generate approximately $355,000 in annual sales tax revenue.		
Environmental Justice – Sections 3.10 and 4.10		
Potential direct and indirect impacts associated with the Proposed Action would not have a disproportionate effect on low-income or minority populations. There are no special issues, such as housing, transportation, access, or resource use in the Project area that would affect the environmental justice population disproportionately.	Impacts to environmental justice under the wet-cooled alternative would be same as those described under the Proposed Action (dry-cooled alternative).	Under the No Action Alternative, no Project-related impacts to environmental justice would occur.
Land Use, Recreation, Transportation and Access – Sections 3.11 and 4.11		
LAND USE: Construction and operation of the Proposed Action would permanently disturb approximately 4,350 acres, and would make this acreage unavailable to be developed for other uses. No residential, commercial, or industrial land uses would be directly impacted by construction or operation of the proposed Project. TRANSPORTATION AND ACCESS: The proposed Project would have short-term impacts on traffic flows and volumes on area roadways. Increased construction traffic on local unimproved roads may contribute to road deterioration. No access to commercial or residential areas would be restricted; however construction activity could potentially delay users' daily commute times within the Valley's transportation network. Operation of the Proposed Action would have long-term, cumulative impacts on traffic flows and volumes on roadways when combined with the other proposed energy projects and the commercial activity associated with increased industry in the area. All disturbance areas not covered by project facilities would be reclaimed in accordance with BLM protocols. RECREATION and SPECIAL MANAGEMENT AREAS:	Impacts to land use, recreation, transportation, and access under the wet-cooled alternative would be the same as those described under the Proposed Action (dry-cooled alternative).	Land use would not change on federal lands. However, land use changes could continue on adjacent private lands. Under the No Action Alternative, no Project-related impacts to transportation and access would occur. Under the No Action Alternative, no Project-related impacts to Areas of Critical Environmental Concern, wilderness, or other special use areas would occur. No project-related impacts to recreational use of public lands would occur.

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action – Dry-Cooled Alternative	**Wet-Cooled Alternative**	**No Action Alternative**
The proposed Project would not preclude the use of recreation and special management areas, but would remove land currently available for dispersed recreation on the Project site. Operation and maintenance of the Project facilities would not limit public access to recreation opportunities in the surrounding area.		
Visual Resources – Sections 3.12 and 4.12		
Visual impacts would occur during the construction of the proposed project based on the introduction of construction equipment, higher levels of traffic, potential fugitive dust, and new forms of night lighting in the foreground distance zone of high sensitivity residential viewers along Sandy Lane and adjacent to Valley View Estates. Long term impacts would be based on the introduction of moderate/strong visual contrast associated with Project components (e.g. solar troughs, power block, transmission lines, and ancillary buildings) within a rural to natural setting that would be visible to moderate and high sensitivity viewers. The majority of long term impacts are anticipated to range from low to moderate based on the relatively low profile of the project and the occurrence of various existing landscape features (i.e. topography, ornamental vegetation, and structures associated with the town of Amargosa Valley) that would screen the project and reduce contrast from moderate and high sensitivity viewers. Limited occurrences of high impacts would occur where moderate to high sensitivity viewers would have unobstructed views of the project in the foreground distance zone (i.e. Sandy Lane and Valley View Estates residences). Compliance is anticipated with BLM Visual Resource Management (VRM) Class IV objectives.	Impacts to visual resources under the wet-cooled alternative would be similar to those described for the Proposed Action with the following exception. Because a wet-cooling unit is less than half the height of a dry-cooled unit, the contrast for key observation points (KOPs) with views of the power block would be less visible to sensitive viewers under the wet-cooled alternative. High impacts would remain for residences located along Sandy Lane and within Valley View Estates; however, impacts would be reduced for all other identified sensitive viewers and residences with views of the Project area.	Under the No Action Alternative, no Project-related impacts to visual resources would occur as no project facilities would be constructed on BLM lands.
Hazardous Materials and Waste – Sections 3.13 and 4.13		
Potential wastes that could be generated at the site include domestic non-hazardous solid waste, hazardous wastes or materials, and used wastes that can be recycled. These types of substances, materials, and wastes most likely would be present during stages of construction,	Impacts from hazardous materials and solid waste under the wet-cooled alternative would be same as those described under the Proposed Action.	There would be no Project-related hazardous materials or solid waste produced under the No Action Alternative.

Table ES-1-4 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action – Dry-Cooled Alternative	**Wet-Cooled Alternative**	**No Action Alternative**
development, and operation of the facility. During all stages of plant construction and operation, strict compliance with all Federal, state, and local regulations governing the management of hazardous materials is required by law.		

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CHAPTER 1 - INTRODUCTION, PURPOSE AND NEED

1.1 Introduction

In Executive Order 13212 of May 18, 2001 (Actions to Expedite Energy-related Projects), President George W. Bush ordered that executive departments and agencies take appropriate actions "to expedite projects that will increase the production, transmission, or conservation of energy." Section 211, of the Energy Policy Act of 2005 (EPAct). (Public Law [PL] 109-58) states "…that the Secretary of the Interior should, before the end of the 10-year period beginning on enactment of this Act, seek to have approved non-hydropower renewable energy projects located on public land with a generation capacity of at least 10,000 megawatts of electricity."

According to the U.S. Department of the Interior (DOI), public lands offer some of the highest renewable energy potential in the nation. The DOI manages 500 million acres of land, one-fifth of the land mass of the United States. On March 11, 2009, Secretary of the Interior Ken Salazar issued a Secretarial Order that made facilitating the production, development, and delivery of renewable energy on public land a top priority for the DOI. Within the DOI, the Bureau of Land Management (BLM) administers approximately 253 million acres of public land in the United States. The BLM has identified approximately 23 million acres in the Southwest as containing high solar energy potential.

The BLM Solar Energy Development Policy establishes a framework to process applications for rights-of-way, and directs the BLM to be responsive to solar energy project applicants, while maintaining its commitment to resource protection. In 2007, the BLM issued Instructional Memorandum Number 2007-097, which established policy for the proeessing of right-of-way applications for solar energy development projects on public land administered by the BLM. The BLM would strive to balance the financial and social benefits from this Proposed Action while minimizing impacts to other resources.

According to the 2005 Nevada Renewable Energy and Energy Conservation Task Force Annual Report to the Legislature and the Governor, Nevada utilities will need in excess of 3,000 gigawatt hours per year (GWh/yr) of new renewable energy generation capability over the next 10 years to meet the state's renewable energy needs (2005). The State of Nevada has established a Renewable Portfolio Standard that all public utilities must meet by investing in, and partnering with, commercial project developers to purchase renewable generated power, and participate in turnkey projects and/or co-development of renewable projects. This standard mandates that 12 percent of retail sales come from renewable resources by 2009-2010; 15 percent by 2011-2012; 18 percent by 2013-2014; 20 percent by 2015-2019; 22 percent by 2020-2024; and 25 percent by 2025. It is expected that at least 1,000 megawatts (MW) of new solar power will be required annually to meet this need.

Further, the Nevada Renewable Energy and Conservation Task Force has estimated that by increasing in-state renewable energy production to just 15 percent of the state's generation, over 5,000 new jobs could be created, with an average annual Gross State Product effect of $665 million through 2035 (2005).

In addition, solar energy projects that commence construction in 2010 can qualify for funding under the American Recovery and Reinvestment Act (ARRA) of 2009 P.L. 111-5 (the "Recovery Act"). The Recovery Act created Section 1705 authorizing a new program for rapid deployment of renewable energy projects and related manufacturing facilities, electric power transmission projects, and leading edge biofuels projects. The primary purposes of the Recovery Act are job preservation and creation, infrastructure investment, energy efficiency and science, assistance to the unemployed, and State and local fiscal stabilization. The Section 1705 Program is designed to address the current economic conditions of the nation, in part, through renewable energy, transmission and leading edge biofuels projects. The proposed Project is one of several solar projects in the western United States that are considered by the federal government to be potentially eligible for ARRA funding. A loan guarantee would reduce the cost financing and therefore the gross project cost over the life of the Project.

1.2 Project Overview

Solar Millennium, LLC (Proponent) submitted a right-of-way application to the BLM Pahrump Field Office to construct and operate the proposed Amargosa Farm Road Solar Energy Project (Project) on BLM-managed land in Amargosa Valley, Nevada.

The proposed Project includes the construction and operation of two 232-MW dry-cooled solar power plants equipped with thermal energy storage capability and associated ancillary linear facilities. Facilities located within the Project area would occupy approximately 4,350 acres and would include solar fields, power blocks, an office and maintenance building, parking area, lay-down area, switchyard, and a stormwater detention basin. Additional elements of the proposed Project would include access roads and optional water pipelines. The Proponent's proposed Project would utilize parabolic trough solar thermal technology to produce electrical power using steam turbine generators fed by solar steam generators. The main element of a parabolic trough power plant is the solar field. The solar field consists of numerous parallel rows of solar collectors, arranged on a north-south axis. The solar collectors follow the path of the sun from east to west during the day to keep the sun's rays continuously focused on a receiver tube. The reflectors consist of parabolic mirrors made from transparent, silver-coated glass, which concentrate the incident solar radiation 80-fold, focusing it onto the receiver tube in the solar collector. The receiver tube contains a heat transfer fluid (HTF), which is a temperature stable synthetic oil in a closed circuit that can be heated to temperatures of up to 752 degrees Fahrenheit (°F) (400 degrees Celsius [°C]). Once heated, the oil is pumped to a centrally located power block, where it flows through a heat exchanger.

The remainder of the process is similar to the steam cycle used in conventional power plants. The steam produced by the heat exchanger is used to drive a turbine connected to a generator, which produces electricity to be fed into a substation. The steam in the turbine condenses back into the water and the water is re-circulated through the solar field. With solar thermal technology, the heat is stored (referred to as thermal storage) and used during periods of cloud cover and up to 4.5 hours after sundown.

At this time, it is anticipated the proposed Project would be built in two separate phases, with the construction of the first phase beginning in 2010, or immediately following issuance of the BLM

right-of-way grant and other federal, state, and local permits and approvals. The Proponent would phase construction so that the first power plant would be operational approximately 1 year before the second power plant becomes operational.

1.3 Project Location

The proposed Project is located on BLM-administered lands, approximately 80 miles northwest of Las Vegas, in the Amargosa Valley in Nye County, Nevada (Figure 1-1). Some portions of the proposed Project would be located on private property, including a 40-acre parcel at the south end of the Project area, and three water supply wells southwest of the Project area. The Project area is located approximately 5 miles south of United States Highway 95 (US 95) and 3 miles west of Nevada State Route 373 (NV 373). The majority of the proposed Project area would be located north of Amargosa Farm Road, and east of Valley View Road. The initial right-of-way application and subsequent Plan of Development erroneously stated the area of the right-of-way to be 7,810 acres. The actual area, by legal description is 7,630 acres. On August 6, 2009, the Proponent sent a letter to the BLM requesting a reduction in the acreage from 7,630 acres to 6,320 acres. The Proponent's decision to release a portion of the requested lands from further consideration was based upon refinement of the Project layout following surveys conducted in the spring of 2009. The lands released from further consideration are shown on Figure 1-1.

Table 1-1 Legal Description of Proposed Project

Township (T)	Range (R)	Section/Portion
T16 South	R48 East	Sec. 1 and 12 – all
T16 South	R48 East	Sec. 2, 11, 13, and 14 – Partial Section
T16 South	R49 East	Sec. 6, 7, and 17 – all
T16 South	R49 East	Sec. 5, 8, 9, 16 18 – Partial Section

1.4 Purpose and Need for Action

1.4.1 Bureau of Land Management Purpose and Need

The BLM's purpose and need for the proposed Project is to respond to the Proponent's application under Title V of the Federal Land Policy and Management Act (FLPMA) (43 U.S.C. § 1761) for a right-of-way grant to construct, operate and decommission a solar thermal generation facility and associated infrastructure in accordance with FLPMA, BLM right-of-way regulations, and other applicable federal laws. The BLM will decide whether to approve, approve with modification, or deny issuance of a right-of-way grant to the Proponent for the proposed Project. The decision the BLM will make is whether or not to grant the right-of-way, and if so, under what conditions.

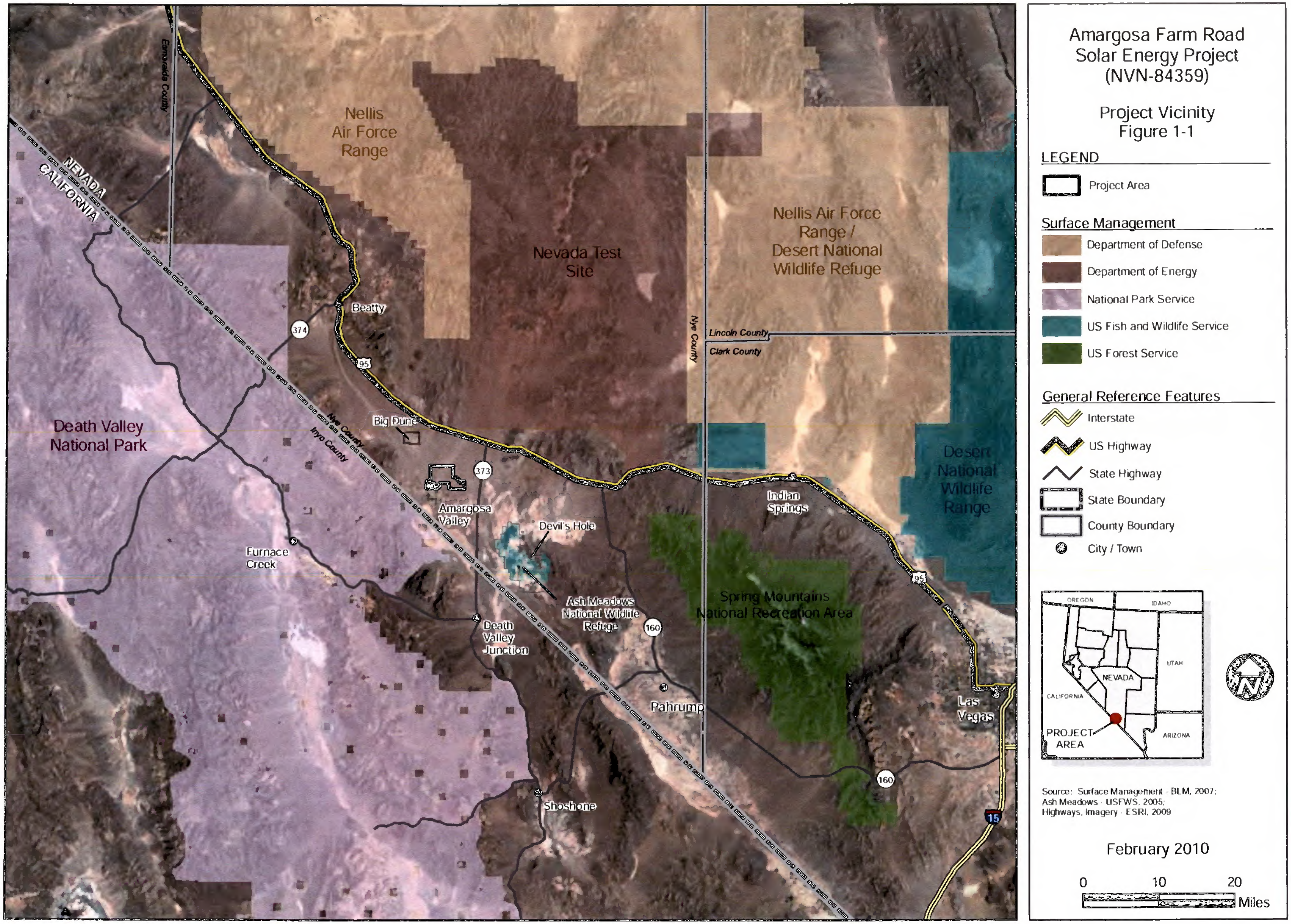
1.4.2 Department of Energy's Purpose and Need

If the Department of Energy (DOE) decides to enter into negotiation of a possible loan guarantee with the Proponent, the DOE would likely become a cooperation agency in developing the Final Environmental Impact Statement (EIS). If the DOE accepts the Proponent's application as suitable for funding, the DOE may adopt this EIS to meet their National Environmental Policy Act (NEPA) requirements in making a determination of funding. The purpose and need for action by DOE would be to comply with its mandate under the EPAct by selecting eligible projects that meet the goals of the EPAct.

When the Final EIS is completed and made available to the public by the BLM, the DOE will carry out an independent review to ensure that DOE comments have been addressed and that the Proposed Action is substantially the same as the action described in the EIS. If these conditions are met, the DOE will adopt the Final EIS without recirculating it pursuant to the Council on Environmental Quality (CEQ) NEPA regulations at 40 CFR 1506.3(c).

While the Final EIS is being developed, the DOE will also be carrying out a detailed financial, technical, and legal evaluation of the proposed Project in the course of negotiating the terms and conditions of a possible federal loan guarantee pursuant to its procedures set out at 10 CFR Part 609. The DOE may reach agreement on a conditional commitment for a loan guarantee prior to completion of the Final EIS and the BLM issuance of the right-of-way grant. Should this be the case a condition precedent will be included in the conditional commitment requiring that the NEPA review and the BLM right-of-way grant process be completed before DOE closes the loan guarantee transaction.

Following conclusion of the NEPA process and the BLM decision, the DOE will issue a Record of Decision (ROD) and proceed to close the loan guarantee transaction provided that the Proponent has satisfied all the detailed terms and conditions contained in the conditional commitment and other related documents, and all other contractual, statutory, and regulatory requirements.



Amargosa Farm Road
Solar Energy Project
(NVN-84359)
Project Vicinity
Figure 1-1
LEGEND
Project Area
Surface Management
Department of Defense
Department of Energy
National Park Service
US Fish and Wildlife Service
US Forest Service
General Reference Features
Interstate
US Highway
State Highway
State Boundary
County Boundary
City / Town
Source: Surface Management - BLM, 2007; Ash Meadows - USFWS, 2005; Highways, imagery - ESRI, 2009
February 2010
0 10 20 Miles
Nellis Air Force Range
Nevada Test Site
Nellis Air Force Range / Desert National Wildlife Refuge
Desert National Wildlife Range
Death Valley National Park
Spring Mountains National Recreation Area
Ash Meadows National Wildlife Refuge
Devil's Hole
Big Dune
Beatty
Amargosa Valley
Furnace Creek
Death Valley Junction
Pahrump
Shoshone
Indian Springs
Las Vegas
NEVADA
CALIFORNIA
Nye County
Inyo County
Esmeralda County
Lincoln County
Clark County
PROJECT AREA
OREGON
IDAHO
UTAH
ARIZONA

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Amargosa Farm Road
Solar Energy Project
(NVN-84359)

Project Area
Figure 1-2

LEGEND

- Initial Right-of-way Limits (November 2007)
- Revised Right-of-way Limits (August 2009)
- Lands Released from Consideration for Project
- Proposed Solar Field
- Alternative Access Road
- Proposed Project Well
- Existing Substation
- Existing Transmission Line (<230kV)
- Private Parcel Line

Note: The Power Block contains the steam turbine, salt storage tanks and other power generating equipment as described in the Plan of Development.

Source: Project Facilities - Solar Millennium, 2009; Wells - Nevada State Engineer, 2008; Substation, Transmission Line - Platts, 2009; Imagery - ESRI, 2009

February 2010

0 0.5 1 Miles

1.4.3 Proponent's Proposal

The Proponent's objectives and purpose of the proposed Project are to:

- Develop a utility-scale parabolic trough solar thermal energy facility that optimizes power generation efficiency and provides energy at a reasonable and competitive cost
- Construct and operate an environmentally compatible, economically sound, and operationally reliable solar power generation facility that will contribute approximately one million MW hours of clean, renewable solar energy per year to meet renewable energy goals
- Locate the Project in an area with high solar insolation (i.e., high intensity of solar energy)
- Minimize environmental impacts, infrastructure needs, and costs by locating the plant near existing infrastructure, such as a transmission line, a substation, an adequate water supply, and highways/access roads, and by using designated corridors to the maximum extent possible
- Develop a power-generation facility with the flexibility to continue producing electricity when the solar resource is not optimal (i.e., during cloud cover and early evening hours) to better match the load demands of utility offtakers
- Develop a solar thermal energy facility that will qualify for, and benefit from, the ARRA Grant Program
- Support the economy of southern Nevada by helping to ensure an adequate supply of renewable electrical energy, while creating additional tax revenues, employment, and expenditures in local businesses

As of December 2009, the proposed Project was one of 31 renewable energy project that have met the required milestones to remain on BLM's fast-track list for expediting processing. Fast-track projects are those where the companies involved have demonstrated to the BLM that they have made sufficient progress to formally start the environmental review and public participation process. These projects are advanced enough in the permitting process that they could potentially be cleared for approval by December 2010, thus making them eligible for economic stimulus funding under ARRA.

1.5 Scope of Analysis

The NEPA process consists of an evaluation of all relevant environmental effects of a federal project or action undertaking. Under NEPA, federal agencies must integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

NEPA directs federal agencies to "utilize a systematic, interdisciplinary approach...in planning and decision-making, which may have an impact on man's environment," to ensure that environmental amenities and values...be given appropriate consideration in decision-making along with economic and technical considerations," and to "study, develop, and describe appropriate alternatives to recommended courses of action.." This mandate applies to all "major

federal aetions" (Title 43, Part 1500 CFR). As a result, the NEPA affects virtually all decisions regarding the use of public lands.

The preparation of an EIS follows a highly formalized process, consisting of eight major steps:

1. Issue the Notice of Intent (NOI) to prepare an EIS
2. Conduct public and agency scoping
3. Prepare the interdisciplinary analysis of the issues and alternatives
4. Issue the Draft EIS
5. Conduct the public review and comment period
6. Issue the Final EIS, which includes responses to comments
7. 30-day waiting period
8. Issue the Record of Decision (ROD)

1.5.1 The Environmental Impact Statement Decision Framework

This EIS analyzes and discloses the environmental impacts of the proposed Project, as well as alternatives chosen by the BLM as detailed in Chapter 2. The EIS provides an analysis of impacts that would result from the implementation of the proposed Project or alternatives. The EIS process is designed to encourage public participation in the BLM's decision-making process and identifies mitigation measures to address environmental consequences. This Draft EIS does not contain final decisions regarding the Proposed Action or alternatives.

1.5.2 Decisions to be Made After this Environmental Impact Statement

In the EIS, in addition to the proposed Project (Proposed Action), several alternatives to the proposed Project are identified and analyzed. The deeisions made regarding the Proposed Action and alternatives will be documented in a ROD signed by the authorized officer, the Pahrump field manager. The BLM decision will only apply to public lands.

Within the ROD, the Pahrump field manager will determine whether:

- the analysis contained in this EIS is adequate for the purposes of reaching an informed decision regarding authorizing a right-of-way
- to approve the Proposed Action, select a different alternative, select a combination of alternatives, or deny the right-of-way request
- the Proposed Action and alternatives are in conformance with applicable land and resource management plans

1.6 Relationship to Bureau of Land Management and non-Bureau of Land Management Policies, Plans, and Programs

If approved, the Proposed Action must be consistent with the BLM Las Vegas Resource Management Plan (RMP)/EIS, approved by ROD on October 5, 1998 (BLM 1998). The

RMP/EIS has been reviewed and it is determined the proposed Project conforms with adopted management objectives and directions as summarized in the RMP and the ROD under the authority of the FLPMA of October 21, 1976, as amended (43 USC 1761 et. seq.).

This EIS was prepared in compliance with: CEQ regulations for implementing the NEPA (40 CFR § 1500-1508; 43 CFR Part 46); the BLM NEPA Handbook, H-1790-1; FLPMA Sections 201, 202, and 206 (43 CFR § 1600); and the BLM Land Use Planning Handbook (BLM Handbook H-1601-1). The BLM also has Instruction Memorandum 2004-105, 149, 231, and 2005-105, which guide and set NEPA compliance policy for the BLM.

Applications for commercial solar energy facilities on BLM-administered lands are processed as a right-of-way authorization under Title V of FLPMA. Title V states that in "designating right-of-way corridors and in determining whether to require that the right-of-way be confined to them, [BLM] shall take into consideration national and state land use policies, environmental quality, economic efficiency, national security, safety, and good engineering and technological practices". The FLPMA further directs that each right-of-way permit contain terms and conditions to protect federal property and economic interests, protect lives and property, and otherwise protect the public interest in the lands traversed by the right-of-way or adjacent to them (43 USC § 1765).

Table 1-2 is a representative list of federal, state, and local laws, statutes, and Executive Orders that may apply to the construction and operation of the proposed Project. The Proponent and its contractors would comply with requirements set forth in these directives, as applicable.

The Proponent, or its designees, is responsible for applying for and acquiring the federal, state, and local permits and approvals listed in Table 1-3.

Table 1-2 Laws, Statutes, Regulations, and Executive Orders with which the Proposed Action and All Alternatives Must Conform
Federal Laws and Statutes
American Indian Religious Freedom Act of 1978 (PL 95-341; 42 USC 1996)
Archaeological and Historic Data Preservation Act of 1974 (PL 86-253, as amended by PL 93291; 16 USC 469)
Archaeological Resources Protection Act of 1979 (PL 96-95; 16 USC 470aa-mm)
Bald and Golden Eagle Protection Act of 1940 (16 USC 668-668d, 54 Stat. 250) as amended (PL 95-616 [92 Stat. 3114]) November 8, 1978
Clean Air Act of 1990 (as amended by PL 92-574; 42 USC 4901)
Department of Transportation Act of 1966, (PL 89-670; 49 USC Section 303)
Endangered Species Act of 1973 (PL 85-624; 16 USC 661, 664 1008)
Energy Policy Act of 2005 (PL 109-58)
Farmland Protection Policy Act (PL 97-98 and 7 CFR Part 658)
FLPMA of 1976, Section 201(a) (PL 94-579; 43 USC 1701 et seq.)
Federal Water Pollution Control Act of 1972, Section 404 (PL 92-500; 33 USC 1344, as amended)
Historic Sites Act of 1935 (PL 292-74; 16 USC 461-467)
Land and Water Conservation Fund Act of 1965 (PL 88-578)
Migratory Bird Treaty Act of 1918 (16 USC 703-712, as amended)
NEPA of 1969 (PL 91-190; 42 USC 4321)
National Historic Preservation Act of 1966, Section 106, (PL 89-665; 16 USC 407(f)
Native American Graves Protection and Repatriation Act of 1990 (PL 101-601)
Paleontological Resources Preservation Act 2009
Executive Orders (EO)
EO 11296 Flood Hazard Evaluation Guidelines
EO 11514 Protection and Enhancement of Environmental Quality
EO 11593 Protection and Enhancement of the Cultural Environment
EO 11988 Floodplain Management (43 CFR 6030)
EO 11990 Protection of Wetlands
EO 12898 Federal Actions to address Environmental Justice in Minority Populations and Low-income Populations
EO 13007 Indian Sacred Sites

Table 1-2 Laws, Statutes, Regulations, and Executive Orders with which the Proposed Action and All Alternatives Must Conform
EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds
EO 13212 Actions to Expedite Energy-related Projects
EO 13287 Preserve America
EO 123772 Intergovernmental Review of Federal Programs
Federal Regulations
40 CFR Parts 1500-1508 CEQ implementation of the NEPA
33 CFR 320-331 and 40 CFR Part 230, Section 404 of the Clean Water Act (CWA) and its Implementing Regulations
36 CFR Part 800, as amended, Protection of Historic Properties
7 CFR Part 658, as amended, Prime and Unique Farmlands
43 CFR Part 2800, as amended, Right-of-way Principles and Procedures
State Laws and Statutes
NRS 527.060-120 Protection and Preservation of Timbered Lands, Trees, and Flora – Definitions Cactus and Yucca
NRS 527.270 List of species declared to be threatened with extinction; special permit required for removal or destruction
NRS 533.030 Adjudication of Vested Water Rights; Appropriation of Public Waters – Appropriation for beneficial use; use for recreational purpose declared beneficial; limitations and exceptions
NRS 533.035 Adjudication of Vested Water Rights; Appropriation of Public Waters – Beneficial use: Basis, measure and limit of right to use
NRS 534.020 Underground waters that belong to the public and are subject to appropriation for beneficial use; declaration of legislative intent
NRS 555.005 Agriculture – Control of Insects, Pests, and Noxious Weeds, Definitions
Definitions: CEQ – Council on Environmental Quality; CFR – Code of Federal Register; EO – Executive Order; NAC – Nevada Administrative Code; NRS – Nevada Revised Statutes; PL – Public Law; et seq. – "and the following"; USC – United States Code

Table 1-3 Authorizations, Permits, Reviews, and Approvals			
Action Requiring Permit, Approval, or Review	**Permit/Approval or Review**	**Accepting Authority/ Approving Agency**	**Statutory Reference**
Federal			
Temporary Land Use Permit; Form 2920	Temporary Use Permit (pre-operational activities on BLM land)	BLM	43 USC 1201; 43 CFR Part 2920
Rights-of-way Over Land Under Federal Management; Form SF-299	Right-of-way Grant	BLM	FLPMA 1976 (PL 94-579) USC. 1761-1771 and 43 CFR 2800
NEPA Compliance to Process Right-of-way Application	EIS and ROD	BLM	NEPA, 40 CFR Part 1500 et. seq.
National Historic Preservation Act Compliance to Process Rights-of-way Application	Section 106 Compliance or Consultation	BLM/Nevada State Historic Preservation Office	National Historic Preservation Act of 1966, 36 CFR part 800; 16 USC 47; NRS Chapter 384
Compliance with the Endangered Species Act	Review by BLM to initiate Section 7 consultation	BLM/USFWS	Endangered Species Act Section 7 Consultation, 50 CFR Part 17, 16 USC 1536
Dredge or Fill Activities in Waters of the United States; Dry Wash Crossings	Jurisdictional Delineation Report Concurrence, Nationwide or Individual Permit	USACE	33 USC 1344
Project Component Height Relative to Air Traffic	No Hazard Declaration required if any structure is more than 200 feet	Federal Aviation Administration	49 USC 1501, 14 CFR Part 77
U.S. Environmental Protection Agency (EPA) ID Number	Compliance with federal hazardous waste management requirements	EPA	40 CFR Part 124, 260, and 270
Oil Pollution Prevention – Spill Prevention, Control, and Countermeasure (SPCC) Plan	If total aboveground storage capacity of oil is greater than 1,320 gallons, then a SPCC Plan is required.	EPA – Office of Emergency Services	40 CFR Part 112, and Section 311(j) of the Clean Water Act
Review of Project for its potential impact on military over flights and operations	Department of Defense R 2508 Complex Sustainability Office	US Department of Defense	Department of Defense
State of Nevada			
Permit to Construct a Public Utility in Nevada	Utility Environment Protection Act – Permit to Construct	Nevada Public Utility Commission	NRS 704.820 – 704.900, NAC 703.415 – 703.427

Table 1-3 Authorizations, Permits, Reviews, and Approvals			
Action Requiring Permit, Approval, or Review	**Permit/Approval or Review**	**Accepting Authority/ Approving Agency**	**Statutory Reference**
Discharge of Stormwater to Waters of the State	Construction Stormwater General Permit (NVR 100000)	Nevada Division of Environmental Protection (NDEP) – Bureau of Water Pollution Control	40 CFR § 122.26(b)(14), NRS 445A.465
Section 401 Certification	Required if Section 404 permit is needed- State certification that federal permit does not violate water quality standards	NDEP – Bureau of Water Quality Planning	Section 401 of CWA
Separate Stormwater Permit for operations	General Stormwater Permit for Industrial Activities	NDEP - Bureau of Water Pollution Control	NRS 445A.465
Temporary permit needed for groundwater discharge associated with construction	Groundwater Discharge Permit	NDEP - Bureau of Water Pollution Control	NRS 445A.465
Operating Permit Class I, II, or III (Depending on Calculated Potential to Emit)	Air Quality Operating Permit	NDEP – Bureau of Air Pollution Control	NRS 445B.100 through 445B.640, NAC 445B.001 through 445B.3689 (operating permits outside Clark County)
Construction Activities Disturbing More than 5 Acres	Stand-alone Surface Disturbance Permit	NDEP – Bureau of Air Pollution Control	NAC 445B
Permit to Store, Use of Manufacture Hazardous Materials at a Facility	Hazardous Materials Permit	State Fire Marshal	NAC 477.323, NAC 477.325
Permit to Appropriate Water; Change of Use	Permit to Appropriate the Public Water of the State of Nevada	Nevada Division of Water Resources	NRS 533 and 534
Public Water System Permit	Non-community Water System	NDEP – Bureau of Safe Drinking Water	NRS 445, NAC 445A.450 through 445A.6731
Use of a Highly Hazardous Substance	Chemical Accident Prevention Program/Authority to Construct and Permit to Operate	NDEP	NRS 459.380
Management of Hazardous Waste	Hazardous Waste Management Permit	NDEP – Bureau of Waste Management	NRS 459.400 through 459.600
Transporting of Hazardous Materials	Hazardous Materials Transportation Permit	Nevada Department of Transportation	NRS 459.400 through 459.600

Table 1-3 Authorizations, Permits, Reviews, and Approvals			
Action Requiring Permit, Approval, or Review	**Permit/Approval or Review**	**Accepting Authority/ Approving Agency**	**Statutory Reference**
Solid Waste Class II Wavered Landfill Authorization	Approval to Operate a Solid Waste System	NDEP – Bureau of Waste Management	NRS 444.440 through 444.645
General Permit to Operate Septic System	On-site Sewage Disposal System	NDEP Bureau of Water Pollution Control	NRS 445A, NAC 445A
Construction of Evaporation Ponds	Industrial Artificial Pond Permit	Nevada Department of Wildlife	NRS 502.390, NAC 502.460 through 502.495
Disturbance of any Native Plant Species and/or Native Plant Habitat Regarded as Threatened with Extinction	Conditional Permit for Disturbance or Destruction of Critically Endangered Plants	Nevada Division of Forestry	NAC 527.260 through 527.300
Disturbance of Wildlife and/or Wildlife Habitat (Not specific to endangered species)	Written Approval Prior to Handling Any Wildlife as Defined by the State of Nevada	Nevada Division of Wildlife	NRS 445, 501.181, and NRS 503.597; NAC 504.520
Encroachment or Construction Activities within Highway Right-of-way	Right of Way Occupancy Permit	Nevada Department of Transportation	NAC 408
Pressure vessel specification and certifications	Boiler & Pressure Vessel Certificate	NV Industrial Relations Division	NRS 455C.100
Required for extraordinarily large or oversized equipment traveling on state roads or unusual impacts to traffic are anticipated	Nevada Department of Transportation Super Load Permit	Nevada Department of Transportation	NRS 484.471
Nye County			
Building and operation fire safety	Fire Safety Compliance Certification	Nye County Bureau of Fire Prevention	Nye County Code
Certification of flood zone location	Flood Damage Prevention Permit	Nye County Planning Department	Nye County Code
Type, location, duration of encroachment onto public roadway	Encroachment Permit	Nye County Department of Public Works	Nye County Code
Building Permit (for structures)	Building Permit	County Building Division	Nye County Code

1.7 Agency Coordination

1.7.1 Cooperating Agencies

Cooperating agency status provides a formal framework for governmental agencies to engage in active collaboration with a federal agency to implement the requirements of the NEPA (42 USC 4321, et seq.). Federal and state agencies and local and tribal governments may qualify as cooperating agencies because of "jurisdiction by law or special expertise" (40 CFR 1501.6 and 1508.5).

The BLM invited nine agencies to consider becoming a cooperating agency. Agencies invited to participate include:

1. Department of Defense (DOD), Regional Environmental Coordination Office
2. Department of Energy (DOE), National Nuclear Security Administration
3. Federal Highway Administration (FHWA)
4. National Park Service (NPS), Death Valley National Park
5. U.S. Army Corps of Engineers (USACE), Sacramento District
6. Nevada Department of Wildlife (NDOW)
7. Nevada Department of Transportation (NDOT)
8. Nye County

The DOD, DOE, NPS, USACE, NDOW, and Nye County have formally requested to be cooperating agencies for the Proposed Action. Each of these agencies has agreed to participate as a cooperating agency and review material for the EIS pertaining to their legal and regulatory responsibilities. The FHWA, USFWS, and NDOT declined the invitation.

1.7.2 Native American Consultation

The BLM conducts consultation and coordination with American Indian tribal governments for proposed projects that may affect their ancestral lands. On June 17, 2009, the BLM sent formal consultation letters to representatives of the Timbisha Shoshone Tribe, the Pahrump Paiute Tribe, the Las Vegas Paiute Tribe, the Chemehuevi Indian Tribe, and the Colorado River Indian Tribes describing six proposed solar energy projects in the Amargosa and Pahrump Valleys, Nye County, including the proposed Project. On August 5, 2009, the same tribes were e-mailed information about the Project's scoping meetings if they wished to attend and make comments. A field visit was conducted with the Timbisha Shoshone in the Project area to review the archaeological resources identified during the cultural resource inventory on September 17, 2009. At this time, no religious or cultural concerns have been brought forth by the BLM for this proposed Project area by any of the Tribes contacted.

1.8 Public Scoping

Public scoping is an integral part of the NEPA planning process. It provides "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a Proposed Action" (40 CFR 1501.7). Public and agency input is solicited in order to identify the range, or scope, of issues to be addressed during the environmental analysis and in the EIS. Initiation of the EIS process and the public scoping meetings for the proposed Project were announced through the Federal Register, BLM press releases, paid advertisements in the media, and postings on the BLM Project website. These activities are described below.

1.8.1 Federal Register Notice of Intent

The BLM Federal Register NOI, published on July 13, 2009 (Volume 74, Number 132, Page 33458), marked the beginning of the public scoping period for the Project EIS. The scoping period, required to be a minimum of 30 days, was announced as ending on August 12, 2009. Public scoping meetings were not conducted within this time period; therefore, a second notice was published in the Federal Register on September 17, 2009 (Volume 74, Number 179, Page 47820), reopening public scoping. This reopened scoping period was announced as ending on October 19, 2009. Four scoping meetings were held from August 17 through August 24, 2009, and one information meeting was held on September 22, 2009.

1.8.2 Media Notices

The BLM prepared a media release to introduce the proposed Project, announce the initial scoping meetings, and invite the public to provide input. The news release was issued on August 12, 2009 to local and regional newspapers, congressional offices, television stations, and radio stations. A second news release was issued on September 3, 2009, announcing the reopening of the scoping period.

In addition, paid advertisements were published in the following local newspapers:

- *Las Vegas Review-Journal* – legal ad published on July 31, 2009
- *Pahrump Valley Times* – display ads published on July 31, 2009 and September 18, 2009

1.8.3 Direct Mailings

A public scoping notice was prepared and mailed to inform the public about the scoping process for the preparation of the EIS and the scheduled scoping meetings. The public was invited to participate in the scoping process and to share any concerns or comments, submit information, and identify issues to be addressed during the EIS process.

The notice was mailed to federal, state, and local agencies; elected officials; Native American tribes; and special interest groups and organizations, during the week of August 3, 2009. The distribution list was compiled from a list of individuals, organizations, and agencies who had

expressed interest in other BLM Pahrump Field Office projects. In addition, the notice was mailed to postal customers in the Amargosa Valley (89020).

A second notice was mailed to individuals and agencies/organizations on the mailing list and the members of the public who signed in at public scoping meetings held in August 2009 for the proposed Project. The second notice was to inform the public of the public information meeting to be held in Beatty on September 22, 2009. This meeting was an opportunity for the public to submit comments during the reopened scoping period.

1.8.4 Project Website

The BLM Southern Nevada District Office is hosting a website to inform the general public about the Proposed Action. Information on the website includes public meeting announcements, a Project description, and the EIS planning process. The website is available at: http://www.blm.gov/nv/st/en/fo/lvfo.html.

1.8.5 Public Scoping Meetings

The BLM held four public scoping meetings to identify issues and concerns regarding the Proposed Action. These scoping meetings provided an opportunity for the public to learn about the Proposed Action and to provide comments. Meeting locations, dates, and times are provided in Table 1-4. In addition to the public scoping meetings, one public information meeting was held during the reopened scoping period.

Table 1-4 Public Scoping Meetings

Location	Date	Time	Attendance*
Beatty, Nevada	August 17, 2009	6:00 – 8:00 p.m.	34
Amargosa Valley, Nevada	August 18, 2009	6:00 – 8:00 p.m.	112
Pahrump, Nevada	August 21, 2009	6:00 – 8:00 p.m.	26
Las Vegas, Nevada	August 24, 2009	6:00 – 8:00 p.m.	60
Beatty, Nevada**	September 22, 2009	6:00 – 8:00 p.m.	66
		Total	**298**

*These counts reflect only those attendees who elected to sign in at the door
**Public information meeting following reopened scoping period.

1.8.6 Comment Methods

During the public scoping period (August 13 through October 19, 2009), a total of 151 comment documents were received. A comment document is defined as a method of response recorded as

part of a public scoping transcript, email, fax, letter, or comment form. Because some documents had more than one comment, the total number of comments received is greater than the number of respondents or individuals who submitted comments. Table 1-5 presents the method of submittal of all responses.

Table 1-5 Comment Method of Submittal	
Method of Submittal	**Number Received**
Comment Form	17
Email	36
Letter or Fax	19
Oral Comments Submitted at the Scoping Meetings (transcribed from the court reporter transcript)	–
Beatty scoping meeting	6
Amargosa Valley scoping meeting	24
Pahrump scoping meeting	8
Las Vegas scoping meeting	22
Beatty information meeting	19
Total responses	**151**

1.9 Substantive Issues Identified During Scoping

Table 1-6 displays the relative interest of respondents who submitted comments on various topics. This breakdown is not intended to show bias towards any issue; it simply indicates the level of interest on various issues. All issues are addressed equally in the EIS.

Table 1-6 Topics of Interest	
Comment Category	**Number Received**
NEPA and NEPA Process	101
Alternatives	87
Air Quality and Climate Change	59
Cultural Resources	8
Cumulative Impacts	39
Environmental Justice	4

Table 1-6 Topics of Interest	
Comment Category	**Number Received**
Fish and Wildlife	45
Floodplains	20
Geology and Mineral Resources	3
Health and Safety	77
Invasive Species	4
Lands and Access	66
Migratory Birds	13
Native American Religious Concerns	5
Noise	7
Recreation	5
Socioeconomic Resources	198
Soils	6
Special Management Areas	28
Threatened, Endangered, and Candidate Plant Species	18
Threatened, Endangered, and Candidate Wildlife Species	53
Transportation	48
Vegetation	37
Visual Resources	25
Waste (hazardous and solid)	40
Water Resources	164
Wetlands and Waters of the U.S.	15
Total	**1,175**

Table 1-7 summarizes the substantive issues and concerns derived from the scoping comments and indicate where each issue identified during scoping is addressed in the EIS. This summary is intended to reflect the comments received during the scoping phase equally and does not attempt to assign value to any input. Specific comments and context are not provided here, only issues represented in those comments that can be applied directly to preparation of the EIS. For example, some respondents provided their views on the value (negative or positive) of solar energy development; only the issue areas they raised in conjunction with their views are provided. Issue statements and questions to address the issues in the EIS can be found in the

public scoping report. Copies of the individual comments received during the scoping period are available for review at the BLM Pahrump Field Office.

Table 1-7 Issues Raised During Scoping

Issues	Section(s) of the EIS Where Addressed
NEPA Process	
The EIS should consider how NEPA goals will be incorporated into the BLM's decision and describe how the proposed Project would be consistent with other national policy considerations.	1.1 – Introduction 1.5 – Scope of Analysis
Requests that the proposed Project be put on hold until all permits and easements have been received and the proposed Project has been reviewed by other agencies (e.g., Nevada Engineers Office, Federal Emergency Management Agency).	1.7 – Agency Coordination
Alternatives	
A reasonable range of management alternatives meeting the purpose and need should include alternative sites, capacities, and technologies, and include those that may not be within the jurisdiction of the lead agency.	2.2 – Alternatives Description
The three different technologies should be analyzed in the EIS: dry-cooling, hybrid cooling, and wet-cooling	2.2 – Alternatives Description
The BLM should consider other locations for the proposed Project that would reduce potential use conflicts and meet the Project purpose and need, even if they are not located on public land.	2.2 – Alternatives Description
Consider use of different solar energy technology, including the use of hybrid or dry-cooled systems or replacing trough technology with photovoltaic (PV).	2.2 – Alternatives Description
Air Quality	
Activities related to the construction and operation of the proposed Project has the potential to result in increased dust. Additionally, construction, operation, and mitigation of the solar generating facility could result in increased emissions.	4.1 – Air Quality
The EIS should identify the types of dust control to be used during construction and operation, and if water is to be used, the amount of water needed, and the source of the water.	4.1 – Air Quality
Air monitoring should be conducted before, during, and after facility construction and operation. Specific concerns were expressed regarding hazardous materials that may be present in airborne dust (e.g., uranium, radon, and other hazardous elements in surface soils).	4.1 – Air Quality 4.13 – Hazardous Materials and Solid Waste

Table 1-7 Issues Raised During Scoping	
Issues	**Section(s) of the EIS Where Addressed**
The EIS should include a discussion of ambient air conditions, National Ambient Air Quality Standards, and criteria pollutant nonattainment areas in all areas considered for solar development, and that the analysis should specify (1) the emission sources by pollutant from mobile sources, stationary sources, and ground disturbance; (2) the timeframe for release of these emissions over the lifespan of the Project; (3) proposed mitigation measures to minimize these emissions.	4.1 – Air Quality
The EIS should identify the need for an Equipment Emissions Mitigation Plan, to identify actions to reduce diesel particulate, carbon monoxide, hydrocarbons, and nitrogen oxide associated with construction activities for equipment such as drilling equipment, generators, compressors, graders, bulldozers, and dump trucks.	4.1 – Air Quality 4.13 – Hazardous Materials and Solid Waste
Cultural Resources	
Ground disturbing activities resulting from construction and operation of a solar generating facility have the potential to discover/disturb cultural resources in the area, including the physical integrity of sacred sites. The EIS should evaluate potential impacts on archaeological, cultural, and historical resources in the vicinity of the Project, including Native American resources, burial sites and artifacts, and historical mining operations and related artifacts.	3.7 – Historic and Cultural Resources 4.7 – Historic and Cultural Resources
Cumulative Impacts	
A number of other solar generating power facilities are being considered in southern Nevada and may impact a variety of resource values and uses, including water supply, endangered species, visual resources, wildlife, and threatened and/or endangered species habitat.	4.17 – Cumulative Impacts
Environmental Justice	
Environmental justice (minority and low income) populations may be affected by the construction and operation of the Project.	4.10 – Environmental Justice
Fish and Wildlife	
Concerns about wildlife habitat from depletion of water resources and impacts to wildlife from site development and facilities.	4.6 – Biological Resources
Concern that impacts may extend beyond the physical footprint of the Project area. Requests made that Project monitoring be conducted to evaluate Project impacts, and adoption of adaptive mitigation solutions be considered.	4.6 – Biological Resources

Table 1-7 Issues Raised During Scoping	
Issues	**Section(s) of the EIS Where Addressed**
Construction and operation of the facility could result in impacts to wildlife in the area, including: • impacts as a result of an increase in shade, dust, and heat, and impacts to wildlife species • impacts as a result of exposure to contaminants in evaporation ponds and/or stormwater ponds if these water structures attract wildlife, particularly migratory waterfowl and bats	4.6 – Biological Resources
Geology, Mineral Resources, and Soils	
The Project may have impacts to soil resources, and may cause soil erosion.	4.3 – Soils
Health and Safety	
Primary concerns were related to safety measures to be used during both construction and operation of the facility, and the proximity of the proposed Project to occupied residential areas (especially to residents living along Sandy Lane), and other built areas, including the Amargosa Elementary School and senior center.	4.9 – Socioeconomic Resources
Concerns regarding the potential for fire and explosions to occur at the site during operations.	4.9 – Socioeconomic Resources 4.13 – Hazardous Materials and Solid Waste
Lands and Realty	
Several right-of-way applications have been filed with the BLM for proposed solar generation facilities. One of the applications is for a proposed site immediately north of the Project and farther away from existing land uses.	2.2 – Alternatives Description
The EIS should describe the reasonably foreseeable future land use and associated impacts resulting from additional power supply in Amargosa Valley.	4.11 – Land Use, Recreation, Transportation and Access
The proposed Project area is located adjacent to existing residential and other community center uses (e.g., church, fire station, senior center).	4.11 – Land Use, Recreation, Transportation and Access
Native American Religious Concerns	
The EIS should address the existence of Indian sacred sites in the Project area and discuss how the BLM would avoid adversely affecting the physical integrity of sacred sites, if they exist.	3.7 – Historic and Cultural Resources 4.7 – Historic and Cultural Resources
The EIS should address EO 13007 and distinguish it from Section 106 of the NHPA.	3.7 – Historic and Cultural Resources

Table 1-7 Issues Raised During Scoping	
Issues	**Section(s) of the EIS Where Addressed**
Noise	
The noise of construction and operation of a solar generating facility may be heard from residential areas near the proposed Project.	4.5 – Noise
Recreation	
No designated recreational uses occur on public lands in the Project area; however, recreational use occurs in the nearby Big Dune Special Recreation Area.	4.11 – Land Use, Recreation, Transportation and Access
Socioeconomic Resources	
Comments about the operation of the proposed facility indicate an interest in the opportunities for employment this Project would generate.	4.9 – Socioeconomic Resources
The proposed Project may impact public services, including potential population influx and increased service needs (e.g., water supply, school attendance, police and fire protection, etc.).	4.9 – Socioeconomic Resources
Tax benefits may be available to local communities as a result of the proposed Project, including benefits to local tax payers and utility companies and lower property taxes.	4.9 – Socioeconomic Resources
Special Management Areas	
The Projeet area is not within or adjacent to any special management area. However, nearby special management areas may be sensitive to the uses proposed by the generation facility.	4.6 – Biological Resources 4.12 – Visual Resources
Threatened, Endangered, and Candidate Plant and Wildlife Species	
There may be threatened, endangered, and special status species and habitat in the Project area. What effect would construction and operation of a solar power generating facility and associated facilities have on local population of Endangered Species Act listed or candidate species or other special status species and suitable habitats?	4.6 – Biological Resources
Transportation	
The existing Amargosa Farm Road is proposed to be rerouted to accommodate the proposed Project and may affect local transportation.	4.11 – Land Use, Recreation, Transportation and Access
Project-related travel may result in increased traffic on Amargosa Farm Road through the local community.	4.11 – Land Use, Recreation, Transportation and Access
Visual Resources	
Construction and operation of a solar facility would introduce multiple structures and modifications to the landscape. The Project area is adjacent to residential areas and community infrastructure (e.g., senior center, fire station school).	4.12 – Visual Resources

Table 1-7 Issues Raised During Scoping	
Issues	**Section(s) of the EIS Where Addressed**
The proposed Project may have impacts on scenic quality and scenic vistas of the surrounding desert landscape.	4.12 – Visual Resources
What effects will the proposed Project have on viewers traveling to and from Death Valley National Park?	4.12 – Visual Resources
What effects will safety/night lighting have on the dark skies and stargazing opportunities?	4.12 – Visual Resources
What effects will a 0.25-mile landscape buffer have in mitigation or shielding views? Are there any design techniques that could blend the Project with the natural environment from a visual perspective?	4.12 – Visual Resources
Waste (Hazardous and Solid)	
The solar generating facility has the potential to produce hazardous waste and concentrated de-watered waste from evaporation ponds.	4.13 – Hazardous Materials and Solid Waste
Water Resources	
Construction and operation of the solar generation facility could result in impacts to the quantity of water, including groundwater and surface water sources. Project activities also have the potential to affect the quality of surface and groundwater as a result of Project discharges (i.e., stormwater, evaporation pond water, effluent).	4.4 – Water Resources
Operation of the proposed solar generating facility would require up to 4,000 acre-feet of water per year. Alternative sources of water should be considered to provide this needed supply. Additionally, other solar generating technologies are available, including PV, dry-cooling, and hybrid systems.	2.2 – Alternatives Description 4.4 – Water Resources
The EIS should disclose the specific locations, amounts, and well completions of existing water rights, which may be purchased or leased for this Project to facilitate a meaningful analysis of impacts; evaluate the extent to which these water rights have been fully utilized in the past (determine any increases in actual pumping, which may occur as a result of the full utilization of the rights); evaluate the impacts and cumulative impacts of the full utilization of these and other existing rights in the basin; and evaluate the impacts of any changes in consumptive use due to the change to solar energy production.	3.4 – Water Resources 4.4 – Water Resources
Wetlands/Waters of the U.S.	
The Project area is located in portions of the Fortymile Wash. Modification of the landscape for construction of the facility could result in alteration of the Fortymile Wash natural drainage patterns in the Project area.	4.4 – Water Resources

1.10 Organization of the EIS

This EIS follows the CEQ recommended organization per 40 CFR 1502.10, and BLM guidelines as described in the BLM Handbook, H-1790-1. Table 1-8 describes the organization of the Draft EIS.

Table 1-8 Organization of the Draft EIS

Chapter 1 – Introduction, Purpose and Need	This chapter provides a description of the purpose of, and need for, the Proposed Action, the role of the BLM in the EIS process, and the required regulatory actions for the proposed Project.
Chapter 2 – Proposed Action and Alternatives	This chapter describes the Proposed Action and alternatives analyzed in the EIS, including the No Action Alternative. Alternatives that were considered but eliminated from further analysis are described, with a discussion of why they were not considered further.
Chapter 3 – Affected Environment	This chapter describes the existing environment that could be affected by granting the rights-of-way requested by the Proponent. The existing environment includes the social and natural environment.
Chapter 4 – Environmental Consequences	This chapter describes possible environmental consequences of the Proposed Action and alternatives analyzed in the EIS. Direct, indirect, and cumulative effects of the Proposed Action and alternatives are assessed and described in order to allow for comparative impact evaluation. Impacts are compared to the social and natural environment that would be expected to exist if no action were taken (the No Action Alternative).
Chapter 5 – Consultation and Coordination	This chapter describes public participation undertaken to date, and additional opportunities that would occur throughout the EIS process. It also lists agencies and organizations that will receive copies of the Draft EIS for review and lists the preparers of the document.
Chapter 6 – References	This chapter includes a list of references used in the preparation of the Draft EIS.
Chapter 7 – Glossary	This chapter includes a glossary of technical terms used in the Draft EIS.
Chapter 8 – Index	This chapter includes an index listing of keywords used in the Draft EIS.

CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This chapter presents a description of the alternatives analyzed in this EIS. The Proposed Action alternative includes the features of the proposed Project including the two, dry-cooled, 232 MW solar plants with thermal storage and their associated facilities. A second alternative considers the construction and operation of two wet-cooled 232 MW solar plants with thermal storage and their associated facilities. Under the No Action Alternative, there would not be a solar facility constructed and the environmental and social setting would continue to be consistent with current conditions. Other alternatives were considered but eliminated from detailed study as explained in this section.

2.1.1 Regulatory Framework for Alternatives

The BLM is required by the NEPA to evaluate not only the Proposed Action, but reasonable alternatives including the No Action Alternative (40 CFR§1502.14). Section 1502.14(a) requires Federal agencies to explore a reasonable range of alternatives, "and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." The CEQ Guidance concerning NEPA regulations adds that reasonable alternatives include those that are "practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ NEPA's 40 Most Asked Questions, Answer to Question #2).

When granting a right-of-way, FLPMA Title V requires BLM to include in the right-of-way terms and conditions that minimize environmental impacts. Specifically, such terms shall "minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment… require compliance with applicable air and water quality standards established by or pursuant to applicable federal or state law; and … require compliance with State standards for public health and safety, environmental protection, and siting, construction, operation and maintenance of" the right-of-way. Consideration of such terms and conditions will be part of the alternatives analyzed in this Draft EIS.

2.2 Alternatives Description

Based on issues, concerns, and opportunities raised during public scoping, interdisciplinary interaction among resource professionals and collaboration with interested agencies, a range of potential alternatives to be considered in the EIS were identified and evaluated by the BLM. Based on meetings and discussion with resource professionals and Project staff, three alternatives were chosen to be evaluated in detail in the EIS.

Alternatives to be evaluated in detail in this EIS include: (1) the Proposed Action as described in the Proponent's Plan of Development (POD), using the dry-cooled option; (2) the Proposed

Action as described in the Proponent's POD, using the wet-cooled option; and (3) the No Action Alternative.

The following section describes the alternatives considered and eliminated from further consideration, followed by a discussion of the No Action Alternative and the Proposed Action.

2.2.1 Alternatives Eliminated from Further Analysis

In accordance with Title 40 CFR Section 1502.14, and consistent with guidance in BLM's NEPA Handbook, alternatives were not carried forward for further analysis if the alternative:

- is ineffective (it would not respond to the BLM's purpose and need).
- is technically or economically infeasible.
- is inconsistent with the basic policy objectives of the Las Vegas RMP/EIS.
- implementation is remote or speculative.
- is substantially similar in design to an alternative that is analyzed.
- would have substantially similar effects to an alternative that is analyzed.

2.2.1.1 Alternative Sites

As part of its' siting process, the Proponent used a refined set of criteria to screen, identify, and prioritize potential land sites for eventual solar development. Criteria include physical characteristics of the site, environmental considerations, as well as economic factors. Each of these criteria was applied during the screening phase for the proposed Project, which led to the selection of the current site.

These criteria included:

- **Solar Resource** – The site needs to be located where high solar insolation is available to maximize the plant's output and allow efficient utilization of the land area affected by project development. For a project to be economically viable, solar insolation levels of greater than 7 kilowatt-hours per square meter per day (kWh/m^2/day) are desirable.
- **Size and Shape** – The site must be large enough (at least 4,000 contiguous acres) and of adequate proportions to include two 232 MW parabolic trough solar thermal plants. The shape of the site should also support an efficient and cost-effective layout of the project facilities.
- **Slope** – The site should be relatively flat, with a slope of 2 percent or less, to minimize the need for extensive grading and a large volume of cut and fill.

- **Environmental sensitivity** – The site should not be highly pristine or biologically sensitive (e.g. not within a designated wilderness area or Area of Critical Environmental Concern (ACEC)).

- **Availability of Infrastructure and Water** – To minimize cost and potential environmental impacts, the site should be located where water resources are available, and interconnection to an existing transmission system is possible without the construction of lengthy transmission lines. In addition, the site should be in reasonable proximity to suitable transportation infrastructure to allow easier access during both construction and operation without creating the need for additional road construction.

- **Site Control** – The land must be available for sale or lease/right-of-way, at a reasonable cost and be free of conflicting encumbrances.

- **Labor Availability** – The site should be close enough to areas with large construction labor pools so as to maximize the number of construction workers within daily commuting range.

- **Economic Viability** – The Project must be economically viable and competitive with other renewable technology projects, including wind, geothermal, and other solar projects. To be viable, the site should be located on property currently available at a reasonable cost, be as close as possible to transmission and transportation infrastructure, and have a high solar resource value.

The selected Project site is located in an area containing excellent solar resource and is large enough to accommodate two 232 MW plants in an optimal layout. In addition, the Project site is relatively flat; not located in any wildlife management or conservation areas; has access to transmission infrastructure and water resources; and was available for an application for a right-of-way from the BLM. Finally, the Project site allows for access to skilled labor and other industrial infrastructure from nearby Pahrump and Las Vegas. Based on these criteria, the present Project site was selected. Three alternative sites were also considered. The three sites include a site southeast of Pahrump "Sandy", a site a few miles south of the proposed Project along Anvil Road in Amargosa Valley "Anvil Road", and a site near the Beatty Airport "Beatty". Right-of-way applications were filed for each of these sites in 2007 and 2008. The right-of-way applications for each of these sites were ultimately withdrawn after the Proponent conducted due diligence and preliminary studies on each site and determined the alternative sites did not meet the above criteria.

The Sandy site consisted of approximately 8,000 acres in Pahrump Valley approximately 20 miles southeast of Pahrump. Due to the slope of the site, as well as the existence of sensitive vegetation types, conflicting encumbrances, and water availability, the site was not a viable option.

The Anvil Road site consisted of approximately 1,000 acres, located a few miles south of the selected Project site. The site was flat and had good access to transmission infrastructure but was too small to accommodate one 232 MW plant, let alone two of them. The Proponent explored acquiring additional land surrounding the site but determined that the acquisition of sufficient

lands was not economically viable. This combined with the size and existing encumbrances on the site, made the site not viable.

The Beatty site consisted of approximately 2,500 acres located adjacent to the Beatty Airport (approximately 35 miles north of the Project site). It was flat and had good solar resource, however, the site was too small for two 232 MW plants, had existing encumbrances and the Proponent determined that access to transmission and water would be more difficult and costly than the Project site that was ultimately selected.

Table 2-1 summarizes the weaknesses of each of the alternative sites.

Table 2-1 Alternative Sites Considered

Alternative Site	Solar Resources	Size and Shape	Slope	Environmental Sensitivity	Availability of Infrastructure	Site Control
Sandy			x	x		x
Anvil Road		x				x
Beatty		x			x	

Various other locations in Nye County were also investigated, but were not ultimately pursued as they failed to meet the Proponent's baseline screening criteria due to site availability and environmental resource conflicts.

The Proponent also considered the alternative of developing the proposed Project as a single 232 MW plant. Generally, building one plant would have fewer environmental impacts. However, given the infrastructure requirements associated with building a single 232 MW plant, building two plants allows for economies of scale and reduces the infrastructure impacts, including transmission access and water development. In addition, a single 250 MW plant would not be as effective in meeting the Project objective of supporting attainment of renewable energy mandates and objectives. For these reasons, the development of a smaller project was rejected.

During the scoping period, several comments were received requesting the Proponent move the Project site further north; at a distance of at least 0.5 to 2 miles away from existing residential or public buildings. The BLM land immediately north of the Project area has a pending right-of-way application on file with the BLM Pahrump Field Office (Cogentrix - NVN-083150). The Proponent filed an overlapping or "second-in-line" right-of-way application on these lands (NVN-087366); however, subsequent discussions between Cogentrix and BLM staff indicate Cogentrix intends to develop a solar energy project at this location within the next 2 to 3 years. Thereby, it is unlikely that the Proponent's overlapping application could be processed.

2.2.1.2 Alternative Solar Technology

The Proponent has requested a right-of-way to construct and operate a dry-cooled solar thermal parabolic trough project. The dry-cooled alternative is the Proponent's preferred alternative primarily because it is a well proven technology for this scale of power generation. Solar thermal parabolic trough technology has a history of successful operation in the United States, removing much of the construction and operational risk from construction and operation of the proposed Project. In addition, the Proponent has significant experience and expertise in developing and constructing parabolic trough plants. The Proponent is a wholly owned subsidiary of Solar Trust of America, LLC, a joint venture between Solar Millennium AG and Ferrostaal AG. Solar Millennium AG is an international developer and supplier of parabolic trough collector technology used in powering solar thermal power plants. Solar Millennium AG developed and designed the first parabolic trough power plants, Andasol 1-3, in Spain. Ferrostaal AG is a worldwide provider of industrial services and plant construction and engineering.

Construction and operation of a solar thermal parabolic trough plant using wet-cooling is an alternative that is considered in this Draft EIS. Wet-cooling technology has performance advantages in comparison to dry-cooling. Performance is enhanced because wet-cooling relies primarily on evaporation to remove heat from the circulating water, while dry-cooling technology uses an air cooled condenser that cools the steam turbine-generator exhaust steam using a large array of fans that force air over finned tube heat exchangers. The disadvantages of dry-cooling are higher capital costs, higher auxiliary operating power requirements and an overall lower plant performance, especially on hot days, when the peak power is needed most. A dry-cooled plant provides about 5 percent less electric energy on an annual basis than a wet-cooled plant, because of reduced performance on hot summer days. The electricity cost for a dry-cooled plant is approximately 6 to 9 percent higher than for a wet-cooled plant. Thus dry-cooling of a trough plant minimizes water use, but at a 6 to 9 percent cost penalty.

2.3 Proposed Action Alternative – Dry-Cooled Alternative

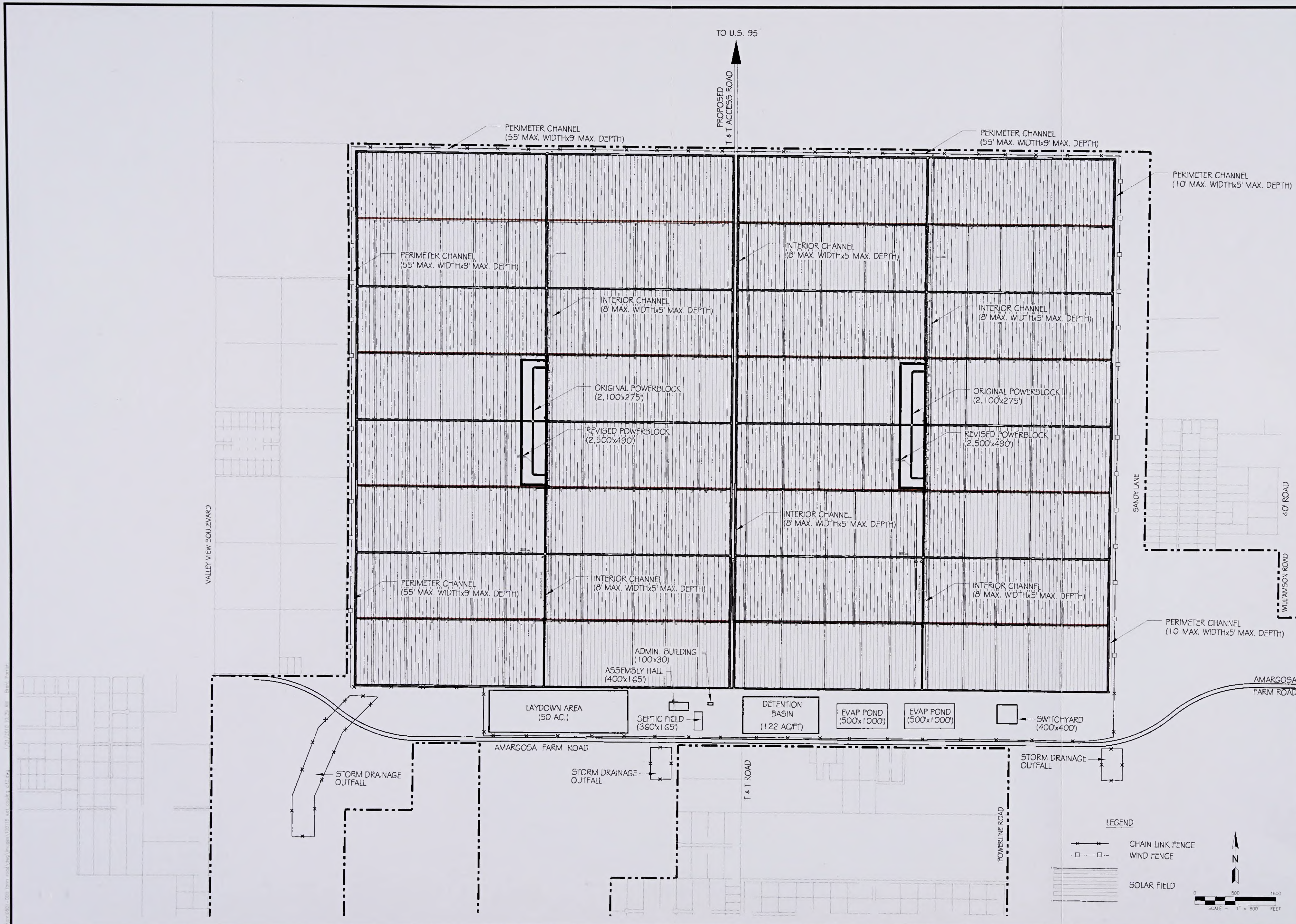
The Proposed Action alternative includes the construction and operation of a two-unit parabolic trough solar power plant, with each unit having a net output of 232 MW. The plant will consist of a conventional steam Rankine-cycle power block, a parabolic trough solar field, a HTF and steam generation system, a nitrate salt thermal energy storage system, as well as a variety of ancillary facilities (sometimes referred to collectively as "balance-of-plant"), such as conventional water treatment, electrical switchgear, administration, warehouse, and maintenance facilities. The electric output of the plant will be provided entirely by solar energy. No electricity will be generated by the use of fossil fuel.

Project facilities would be located on approximately 4,350 acres and would include the solar fields, power blocks (located in the center of each solar field), an office and maintenance building, parking area, lay-down area, stormwater detention basin, and switchyard. The location of certain Project facilities (assembly hall, administration building, laydown area, septic field, detention basin(s), and switchyard) depends on realignment of Amargosa Farm Road. The Proponent is currently working with Nye County Public Works Department to realign Amargosa

Farm Road either 250 feet or 0.25 miles (1,320 feet) south of the existing roadway. The realigned portion of Amargosa Farm Road would extend from the vicinity of Sandy Lane to Valley View Road; a distance of approximately 3.5 miles. If the road is realigned 250 feet south, the facilities would be located south of Amargosa Farm Road; which would separate the solar fields from these facilities. If the road is realigned 1,320 feet (0.25 miles) south, the facilities would be located north of Amargosa Farm Road; thereby keeping the Project components entirely north of Amargosa Farm Road. Preliminary Project site plans depicting the two alignment alternatives for both the dry-and wet-cooled alternatives are provided in Figure 2-1 through 2-4.

The Proponent is evaluating two water supply options including: 1) purchase or lease of existing water rights and moving the point of diversion to the power block area; which would require construction of a new well(s); or 2) purchase or lease of existing water rights and construct a water pipeline from existing well(s) to the Project site. Both options are currently being evaluated.

The final plant layout will be determined based on engineering design and in consideration of resource constraints and opportunities. General facility dimensions are listed in Table 2-2.



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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

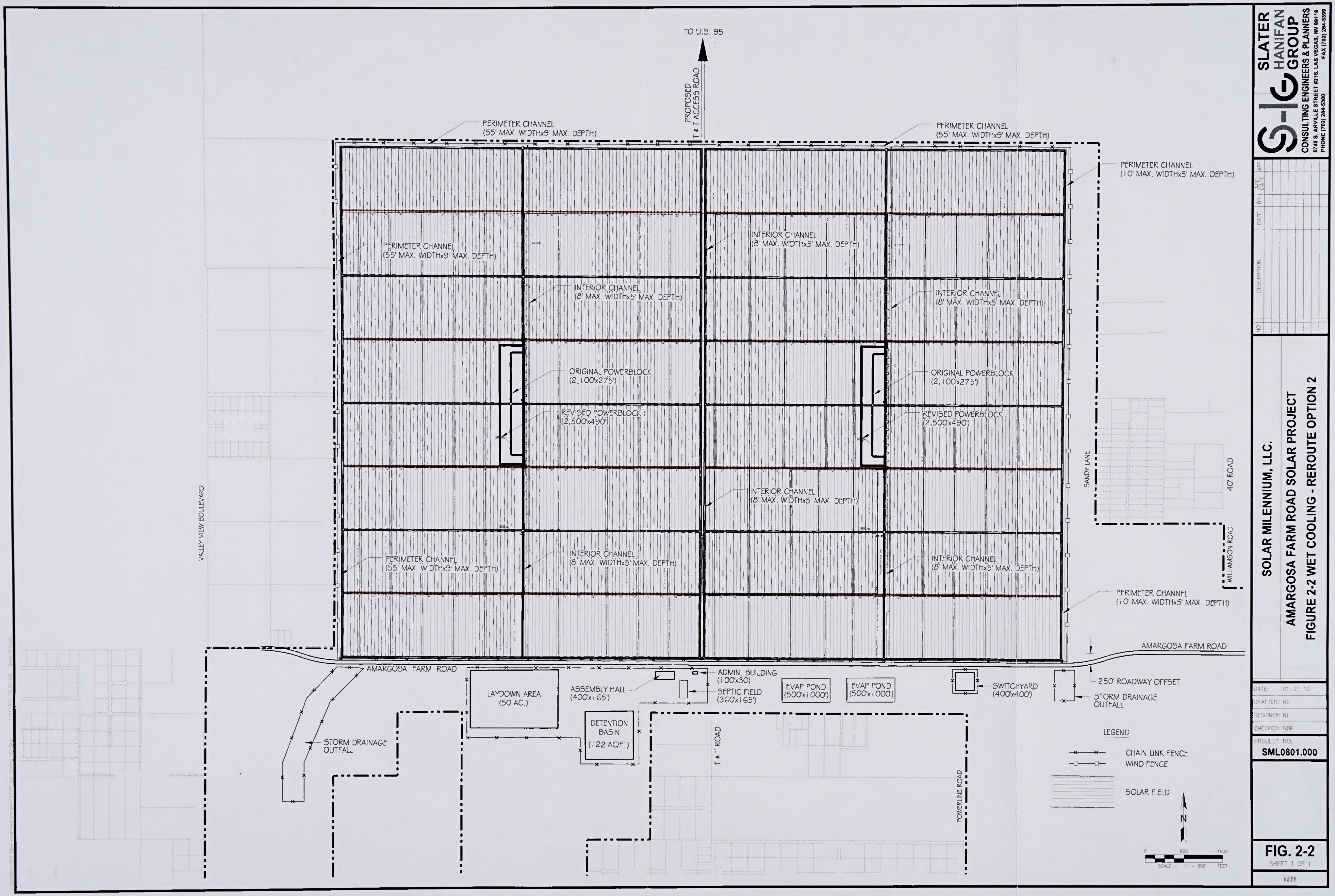
SOLAR MILENNIUM, LLC.

AMARGOSA FARM ROAD SOLAR PROJECT

FIGURE 2-1 WET COOLING - REROUTE OPTION 1

DATE: 01-21-10
DRAFTER: NL
DESIGNER: NL
CHECKED: BDP
PROJECT NO. SML0801.000

FIG. 2-1
SHEET 1 OF 1



TO U.S. 95
PROPOSED T & T ACCESS ROAD
PERIMETER CHANNEL (55' MAX. WIDTHx9' MAX. DEPTH)
PERIMETER CHANNEL (55' MAX. WIDTHx9' MAX. DEPTH)
PERIMETER CHANNEL (10' MAX. WIDTHx5' MAX. DEPTH)
PERIMETER CHANNEL (55' MAX. WIDTHx9' MAX. DEPTH)
INTERIOR CHANNEL (8' MAX. WIDTHx5' MAX. DEPTH)
INTERIOR CHANNEL (8' MAX. WIDTHx5' MAX. DEPTH)
INTERIOR CHANNEL (8' MAX. WIDTHx5' MAX. DEPTH)
ORIGINAL POWERBLOCK (2,100x275')
ORIGINAL POWERBLOCK (2,100x275')
REVISED POWERBLOCK (2,500x490')
REVISED POWERBLOCK (2,500x490')
INTERIOR CHANNEL (8' MAX. WIDTHx5' MAX. DEPTH)
PERIMETER CHANNEL (55' MAX. WIDTHx9' MAX. DEPTH)
INTERIOR CHANNEL (8' MAX. WIDTHx5' MAX. DEPTH)
INTERIOR CHANNEL (8' MAX. WIDTHx5' MAX. DEPTH)
PERIMETER CHANNEL (10' MAX. WIDTHx5' MAX. DEPTH)
VALLEY VIEW BOULEVARD
SANDY LANE
40' ROAD
WILLIAMSON ROAD
AMARGOSA FARM ROAD
AMARGOSA FARM ROAD
ADMIN. BUILDING (100'x30')
ASSEMBLY HALL (400'x165')
SEPTIC FIELD (360'x165')
LAYDOWN AREA (50 AC.)
EVAP POND (500'x1000')
EVAP POND (500'x1000')
SWITCHYARD (400'x400')
250' ROADWAY OFFSET
STORM DRAINAGE OUTFALL
STORM DRAINAGE OUTFALL
DETENTION BASIN (122 AC/FT)
T & T ROAD
POWERLINE ROAD
LEGEND
CHAIN LINK FENCE
WIND FENCE
SOLAR FIELD
N
0 800 1600
SCALE 1" = 800' FEET
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
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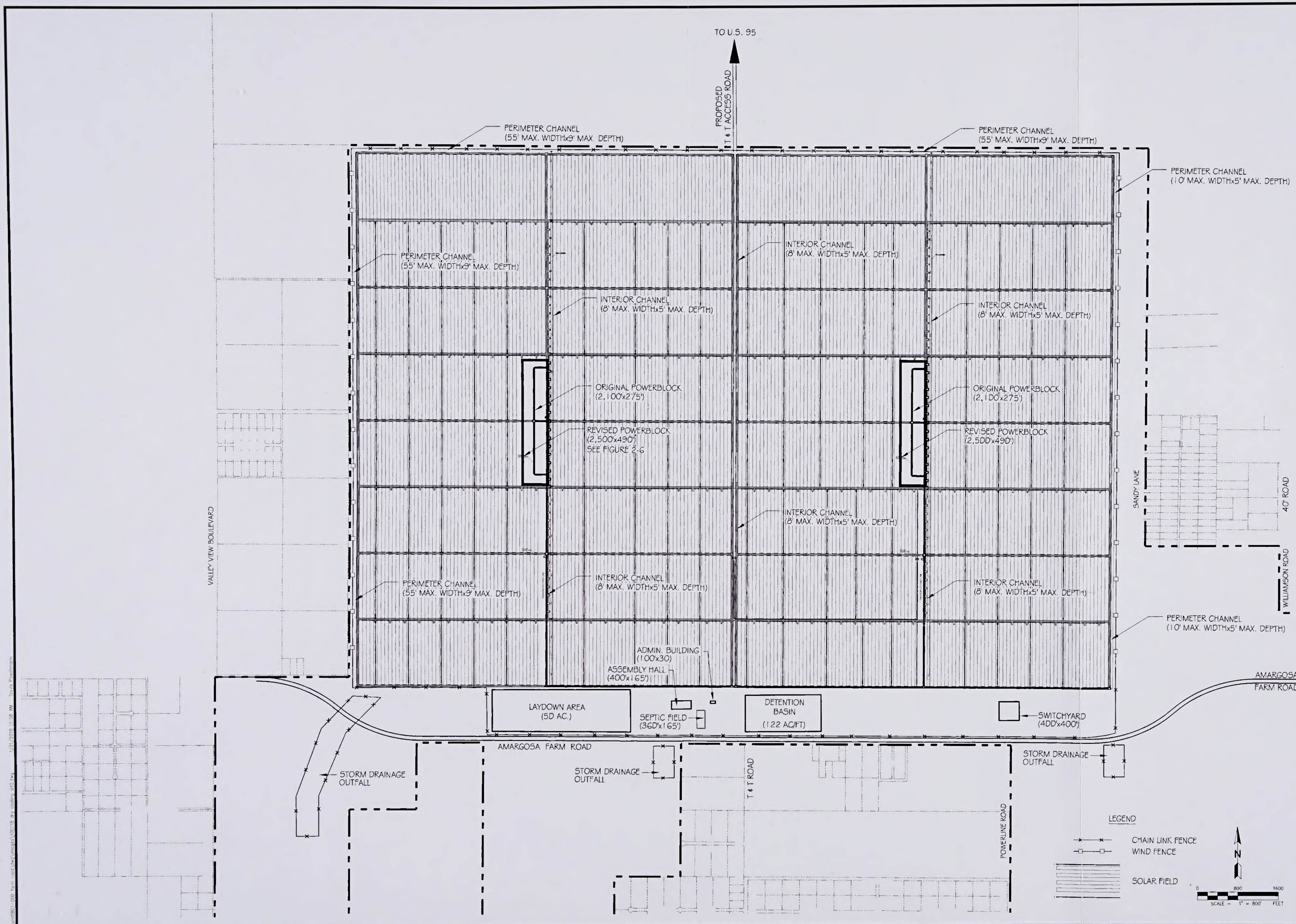
NO. DESCRIPTION DATE BY APP. DATE
SOLAR MILLENNIUM, LLC.
AMARGOSA FARM ROAD SOLAR PROJECT
FIGURE 2-2 WET COOLING - REROUTE OPTION 2
DATE: 01-21-10
DRAFTER: NL
DESIGNER: NL
CHECKED: BDP
PROJECT NO.
SML0801.000
FIG. 2-2
SHEET 1 OF 1



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NO	DESCRIPTION	DATE	BY	APP. DATE	APP.

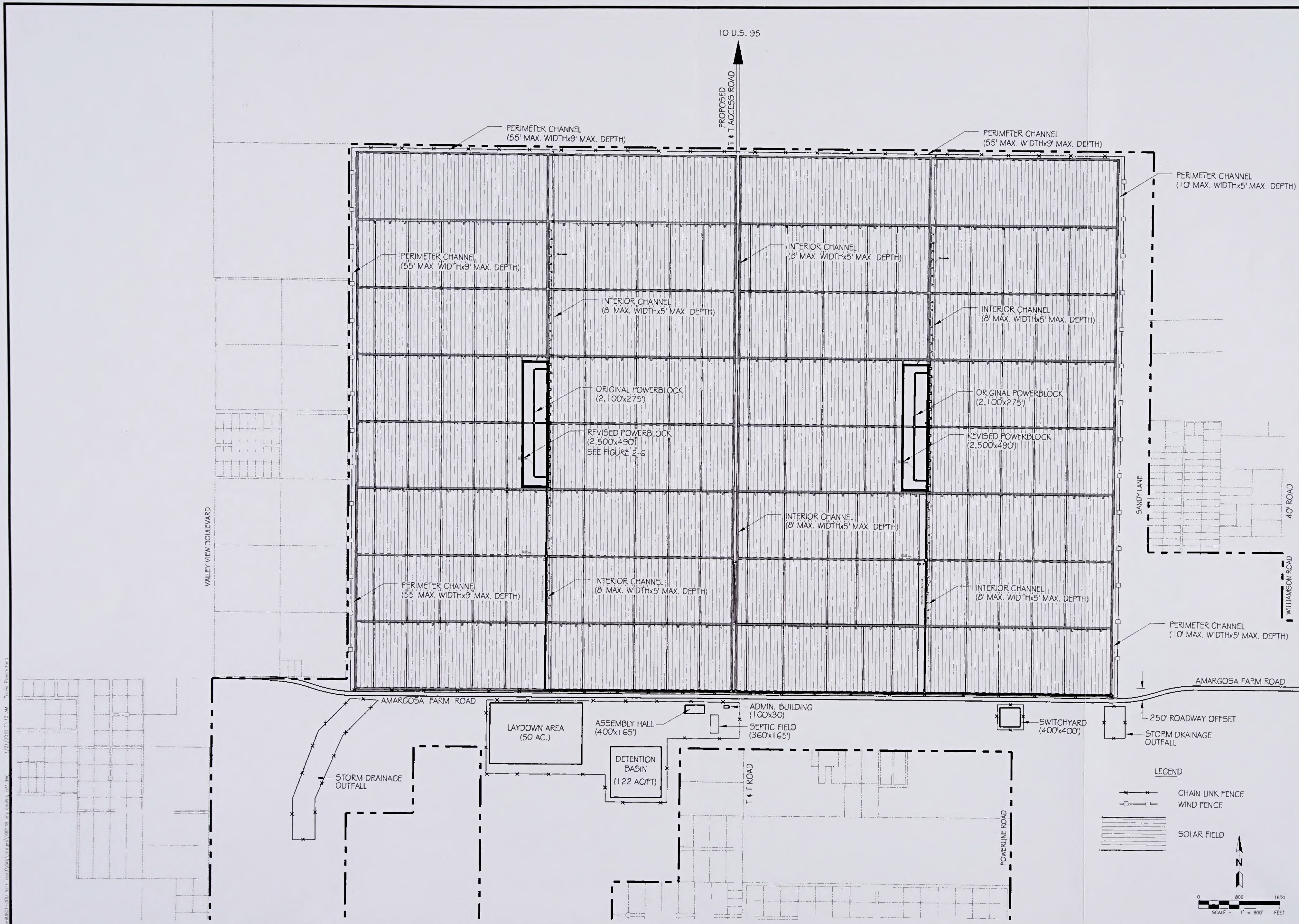
SOLAR MILENNIUM, LLC.

AMARGOSA FARM ROAD SOLAR PROJECT

FIGURE 2-3 DRY COOLING - REROUTE OPTION 1

DATE: 01-21-10
DRAFTER: NL
DESIGNER: NL
CHECKED: BDP
PROJECT NO. SML0801.000

FIG. 2-3
SHEET 1 OF 1



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NO	DESCRIPTION	DATE	BY	APP. DATE	APP

SOLAR MILENNIUM, LLC.

AMARGOSA FARM ROAD SOLAR PROJECT

FIGURE 2-4 DRY COOLING - REROUTE OPTION 2

DATE: 01-21-10
DRAFTER: NL
DESIGNER: NL
CHECKED: BOP
PROJECT NO. SML0801.000

FIG. 2-4
SHEET 1 OF 1

Table 2-2 Preliminary Facility Dimensions

Project Component	Approximate Dimensions / Acreage	Dry-Cooled	Wet-Cooled
Solar Fields	Two fields, Approximately 7,800 feet east-west by 11,000 feet north-south. Each field has a collector aperture area of approximately 2 million square meters. 1,970 acres	X	X
Power Blocks	One power block located in the center of each solar field; approximately 2,500 feet x 490 feet; 144 feet high for a dry-cooled tower, or 55 feet high for a wet-eooled tower (28 acres each)	X	X
Switchyard	400 feet x 400 feet (3.7 acres)	X	X
Assembly Hall/Maintenance Building	330 feet x 130 feet x 35 feet (1 aeres)	X	X
Office	100 feet x 30 feet x 12 feet (.06 acres)	X	X
Parking Area	250 feet x 100 feet (0.5 acres)	X	X
Stormwater Detention Basin	1,200 feet x 1,200 feet (33 aeres) – providing 122-acre-feet of storage assuming 4-foot-deep basin)	X	X
Evaporation Pond(s)	Up to two ponds; 800 feet x 1,250 feet each, approximately 46 acres total		X
Bioremediation Area	400 feet x 800 feet (7.3 acres)	X	X
[1] Components eontained within the power block area are shown on Figure 2-6.			

A land survey of the proposed right-of-way is being performed to determine the final boundary and extent of the Project area. A topographic survey was performed to obtain one-foot contours for final engineering design for grading and drainage-related requirements. A preliminary geotechnical study of the Project site will be conducted to evaluate general subsurface conditions, seismicity, and other geological hazards and to provide recommendations for design and construction of the foundations for Project structures.

All plant facilities will be designed, constructed, and operated in accordance with applicable laws, ordinances, regulations, and standards. All generating facilities will be located within the facility fence line. Project-related linear facilities located outside the plant site fence line are limited to the selected access road and the wells and associated water pipelines to convey water to the site.

2.3.1 General Process Description

The solar power plant cycle basically consists of three distinct, coupled systems: the solar field and HTF system, the thermal energy storage system, and the power block. At the basic level, the HTF moves accumulated solar heat from the parabolic trough solar field to drive the turbine generator. The system distributes cold HTF from the power block to solar field collector loops, and collects hot HTF from the solar field, and inputs the collected heat to the feedwater/steam cycle. A schematic depicting this process is shown on Figure 2-5.

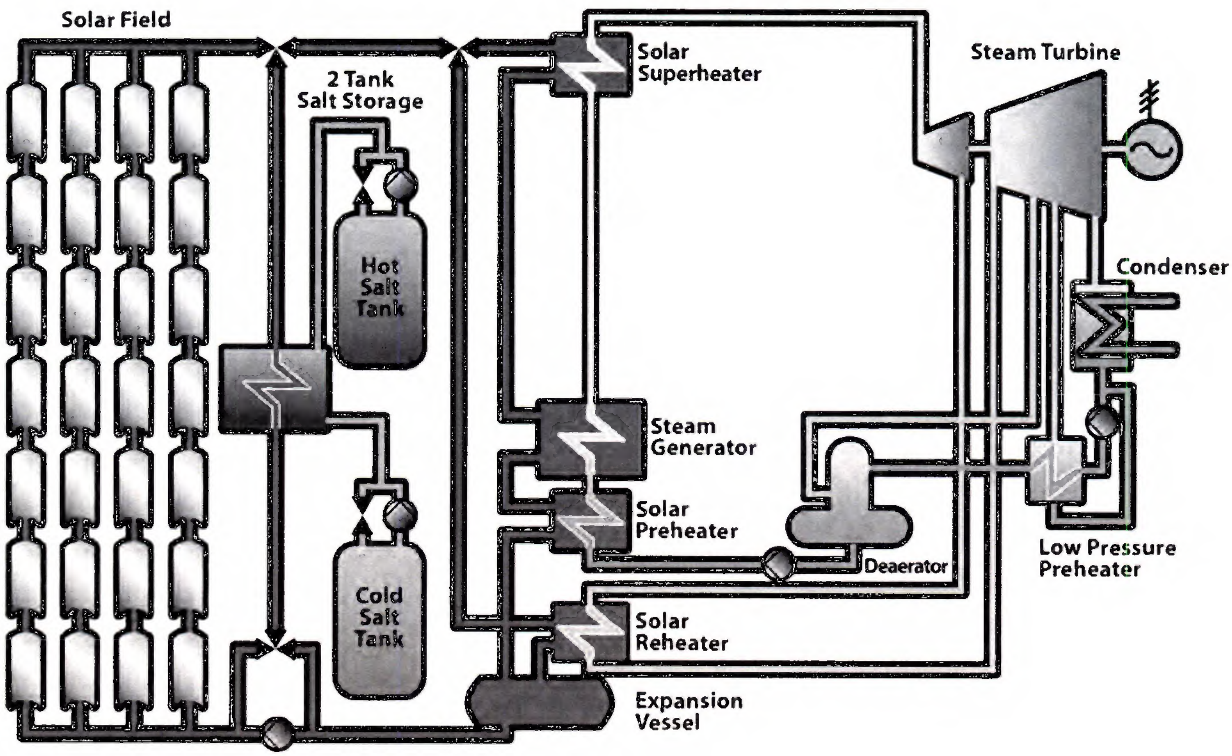


Figure 2-5 Plant Schematic Diagram (with thermal storage)

The HTF cycle is driven by two parallel pump stations. The nominal flow rate is about 2,800 kilograms per second (6,200 pounds per second). During operation, the HTF temperature varies from 739 °F (393 °C) ["hot"] after heating by the solar field to 565 °F (296 °C) ["cold"] leaving the power block heat exchangers. The hot HTF flows to parallel steam generation trains. Each train includes a preheater, steam generator, superheater and reheater. In normal operation, the hot HTF stream is split between the trains. It is also possible to remove each train from the loop via motor control valves.

As the solar field begins tracking the sun and the HTF heats up, its thermal expansion is accommodated in an expansion vessel. If the HTF in this vessel reaches its design working level it flows into overflow vessels. If thermal input to the HTF stops, the HTF begins to contract. The HTF level in the expansion vessel falls, and the overflow return pumps transfer the HTF from the overflow vessels back into the expansion vessel to maintain sufficient content at that location.

2.3.2 Solar Fields

Approximately 90 percent of the plant footprint is taken by the two parabolic trough solar field. The solar fields will be modular, distributed systems of 4 solar collector assemblies (SCAs), or *loops* connected in a series-parallel arrangement via a system of insulated pipes. A loop is approximately 72 feet wide and 2,790 feet long, and is designed to raise the temperature of the heat collection fluid by approximately 175 °F (79.4 °C). The collectors will be equipped with a sun tracking mechanism that moves the reflecting panels toward the sun to the optimum angle for solar energy collection.

2.3.2.1 Solar Collector Assemblies

The SCAs are oriented north and south and rotate east to west to track the sun as it moves across the sky throughout the day. The SCAs collect heat by means of linear troughs of parabolic reflectors that focus sunlight onto a straight line of heat collection elements (HCEs) welded along the focus of the parabolic trough. Each SCA includes local measurement instrumentation, a hydraulic drive system, and a controller that independently tracks the sun to maintain mirror focus on the HCEs and protects the HCEs from overheating.

Each SCA will be supported by structures (stands) that connect the parabolic troughs to the drive mechanism. Each array will be supported by multiple individual foundations with a foundation located approximately every 63 feet, along the assembly. Foundation design will be based on site-specific geotechnical conditions to ensure that the SCA stands are able to support all loading conditions (including wind loading) at the Project site.

2.3.2.2 Parabolic Trough Collector Loop

Each of the collector loops consist of two adjacent rows of SCAs, each row about 1,200 feet long. The two rows are connected by a crossover pipe. The HTF is heated to a high temperature as it circulates through the receiver tube and returns to a series of heat exchangers in the power block where the fluid is used to generate high-pressure superheated steam. The superheated steam is then fed to a conventional power block, consisting of a reheat steam turbine generator (STG) to produce electricity, and carried to a nearby substation via a project-specific transmission line. In normal operation, HTF enters the field at 565 °F (296 °C) and leaves the field at 739 °F (393 °C).

The HTF is a synthetic hydrocarbon liquid mixture of diphenyl ether and biphenyl oxide. Similar formulations are marketed by different manufacturers under the names of Therminol or Dowtherm. The HTF is not classified as a hazardous material by the U.S. Department of Transportation (USDOT), and is not listed under EPA Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations. It has a crystallizing (freezing) point of about 54 °F (12 °C). Freeze protection is routinely accomplished by circulating HTF at a very low flow rate through the solar field using hot HTF from the vessel as a source.

2.3.2.3 Parabolic Mirrors

The parabolic mirrors to be used in the solar fields are low-iron glass mirrors, and are known to be one of the most reliable components in the SCAs. No long-term degradation of the mirrors has been observed at other solar thermal plants, and older mirrors can be brought back to nearly full reflectivity with simple cleaning. Typical life spans of the reflective mirrors are expected to be 30 years or more. The HCEs of the solar plant are comprised of a steel tube surrounded by an evacuated glass tube insulator. The steel tube has a coated surface that enhances its heat transfer properties with a high absorptivity for direct solar radiation, accompanied by low emissivity. Glass to metal seals and metal bellows are incorporated into the HCE to ensure a vacuum-tight enclosure. The enclosure protects the coated surface and reduces heat losses by acting as an insulator.

The glass tube cylinder has anti-reflective coating on both the inner and outer surfaces to reduce reflective losses off the glass tube, thereby increasing the transmissivity. Usually, to maintain the tube's insulating properties, getters, or scavengers, are installed in the vacuum space to absorb hydrogen and other gases that may permeate into the vacuum cylinder over time.

2.3.2.4 Process Control of the Solar Field

The solar field system operates under the control of the field supervisor controller (FSC), a computer located in the central control room that communicates with each SCA and with the plant's distributed control system (DCS). The FSC collects information from each SCA and from the DCS, and issues instructions to the field as a whole, and/or modular instructions to SCA loops or individual SCAs. It deploys the solar field during the day when weather and plant availability permit, and stows it at night and during high winds.

A weather station located in the power block area provides real-time measurements of weather conditions that affect the solar field operation. Radiation data are used to determine the performance of the solar field. Wind speed data are needed since under high wind conditions the solar field must be stowed. The FSC communicates with the plant's DCS, which coordinates and integrates power block, HTF system, and solar-field operation. The DCS communicates with all subsystem controls, including electrical system equipment, steam cycle controllers, variable frequency drives and balance of plant system controllers via serial data communications. It receives analog and digital inputs/outputs from all instruments and equipment not served directly by dedicated local controllers.

The DCS enters solar field control mode automatically after completing warm-up mode. At the beginning of warm up, the HTF is circulated through a bypass around the power block heat exchangers until the outlet temperature reaches the residual steam temperature in the heat exchangers. The HTF is then circulated through the heat exchangers and the bypass is closed. As the HTF temperature at the solar field outlet continues to rise, steam pressure builds up in the heat exchangers until the minimum turbine inlet conditions are reached, upon which the turbine can be started and run up to speed. The turbine is synchronized and loaded according to the design specification until its power output matches the full steady state solar field thermal output.

The DCS regulates the flow by controlling the HTF main pump speeds to maintain the solar field outlet temperature of approximately 739 °F (393 °C). Several HTF pumps will be operated in parallel, at the speed required to provide the required flow in the field, but in exceptional cases (e.g., during maintenance), lower numbers of pumps may be used alone, providing up to 70 percent of full flow at nominal pump capacity. If the thermal output of the solar field is higher than the design capacity of the steam generation system, the HTF flow is directed to the salt heat exchanger train. Cold salt is circulated from the cold salt tank, through the HTF heat exchangers, and into the hot salt storage tank. If both the steam generation train and salt heat exchanger trains are fully loaded, collectors within the solar field are de-focused to maintain design operating temperatures.

If the minimal thermal input to the turbine required by the operating strategy cannot be met under the prevalent weather conditions, then shutdown is indicated. Operators would track all solar collectors into the stow position, reduce the number of HTF main pumps to a minimum, and stop the HTF flow to the power block heat exchangers.

During periods when the solar power generating facility is shutdown, the HTF is circulated through the piping in the solar fields at low flow rate. For most of the year, under typical weather conditions, no supplemental heat is required to keep the HTF flowing freely. However, it is anticipated that on colder winter nights, supplemental heat will be required to ensure the HTF doesn't freeze in the piping. A gas-fired HTF heater, with a rated capacity of 35 million British thermal units per hour (MMBtu/hr), will be provided as part of the HTF system. It is expected that the HTF heater will need to operate approximately 50 hours per year to keep the HTF from freezing.

2.3.3 Power Blocks

The power blocks, including the steam cycle, HTF system and thermal storage system, are located at the center of each solar field. The electrical and local control buildings, workshop buildings, electrical equipment buildings, and water treatment facilities will be located within the power blocks. A list of components contained within each power block, and their general location are shown in Figure 2-6. Major components specific to the power block are briefly described in the following section.

2.3.3.1 Solar Steam Generator System

The solar steam generator (SSG) system transfers heat from the HTF to the feed water (refer to Figure 2-5). The steam generated in the SSG is piped to a Rankine-cycle reheat steam turbine. Heat exchangers are included as part of the SSG system to preheat and boil the condensate, superheat the steam, reheat the steam, which is then sent to the STG.

The steam expands through the STG turbine blades to drive the steam turbine that, in turn, drives the generator, which converts mechanical energy to electrical energy. The Project's STG is expected to be a three-stage casing type with high-pressure, intermediate-pressure, and low-pressure steam sections. The STG is equipped with accessories required to provide efficient,

safe, and reliable operation. Major components include steam stop and control valves, a gland seal system, lubricating and jacking oil systems, thermal insulation, and control instrumentation.

The SSG system and STG will be located outdoors and supported on reinforced, concrete mat foundations. The STG foundation will include a reinforced concrete pedestal.

2.3.3.2 Power Block Heat Transfer Fluid System

In addition to the HTF piping in the solar field, the HTF system within the power block includes three elements: (1) the HTF heater, (2) the HTF expansion and overflow vessels and (3) the HTF ullage system. To eliminate the problem of HTF freezing, an HTF heater will be installed and used to ensure system temperature stays above 54 °F whenever the unit is off-line. An expansion vessel is required to accommodate the volumetric change that occurs when heating the HTF to the operating temperature.

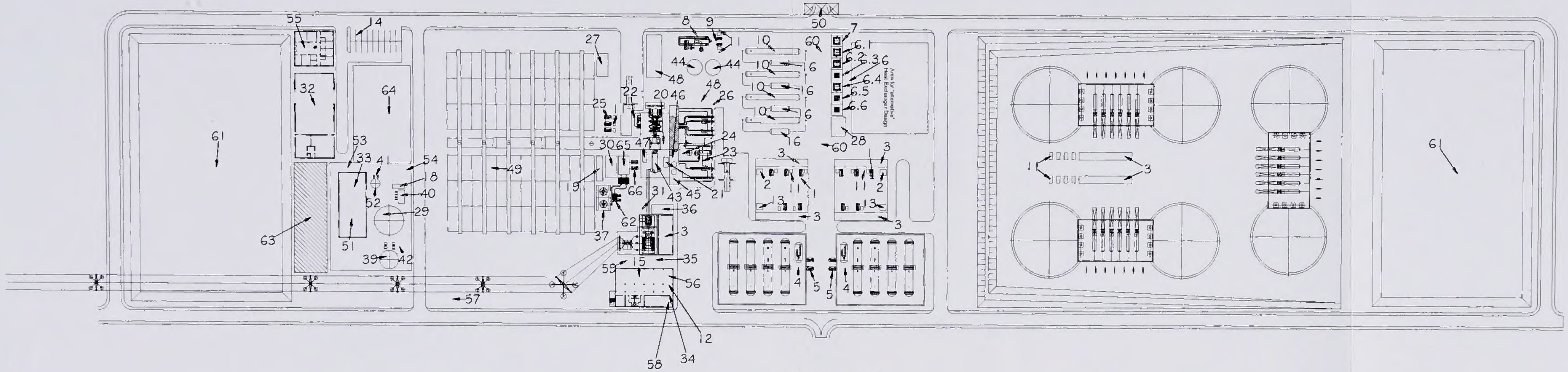
During plant operation, the HTF will degrade into components of high and low boilers (substances with high and low boiling points). The low boilers are removed from the process through the ullage system. The HTF is removed from the HTF surge tank and flashed, leaving behind high boilers and residual HTF. The flashed vapors are condensed and collected in the ullage system.

Leak detection of HTF will be accomplished in various ways. Visual inspection throughout the solar field on a daily basis will detect small leaks occurring at ball joints or other connections. Such leaks can be corrected via minor repairs or repacking of joints and valves. The configuration of the looped system, allowing different sections of the loops to be isolated, will facilitate the repair of small leaks. Since larger leaks are of a greater concern, detection of large leaks is being proposed by using remote pressure sensing equipment and remote operating valves to allow for isolation of large areas of the loops in the solar field. Details of the design will be developed in the design detail process.

2.3.3.3 Thermal Energy Storage

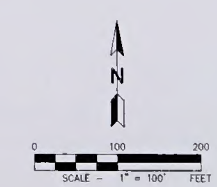
Each plant will include thermal storage, consisting of three dual, two-tank molten salt systems, sufficient to support approximately 4.5 full load-equivalent hours of electric energy after sundown and on cloudy days. The thermal energy storage system contains hot and cold storage tanks connected via 2 parallel trains of 6 oil-to-salt heat exchangers in series. For charging the storage, the salt is heated up to approximately 726.8 °F (386 °C), and for discharging it is cooled down again to approximately 557.6 °F (292 °C).

The salt freezes at approximately 429.8 °F (221 °C). Freezing of the salt must be avoided to prevent damage of components. The freeze protection system, which uses the hot HTF, keeps the salt at a minimum temperature of 500 °F (260 °C). To avoid freezing of the salt in non-working periods, the heat exchangers are equipped with electrical heat tracing.



POWER BLOCK DETAIL
SCALE 1"=100'

1. HTF MAIN PUMPS
2. HTF PUMPS SEAL OIL UNIT
3. SWITCH YARD
4. OVERFLOW VESSEL AND EXPANSION VESSEL
5. OVERFLOW RETURN PUMPS
6. ULLAGE COOLERS AND VESSEL
   - 6.1 HTF STORAGE TANK
   - 6.2 COLLECTING TANK
   - 6.3 RECLAMATION FLASH VESSEL
   - 6.4 RECLAMATION DRAIN VESSEL
   - 6.5 ULLAGE VESSEL 1
   - 6.6 ULLAGE VESSEL 2
7. NITROGEN SYSTEM
8. HTF HEATER
9. FREEZE PROTECTION PUMPS
10. STEAM GENERATORS
11. VARIABLE FREQUENCY DRIVE SYSTEM
12. WEATHER STATION
13. HTF PUMPS LUBE OIL UNIT
14. PARKING
15. BALANCE OF PLANT ELECTRICAL
16. REHEATERS
17. EXCITATION TRANSFORMER
18. WATER TREATMENT MCCS
19. MCC COOLING TOWER AREA
20. STEAM TURBINE
21. GLAND STEAM CONDENSER
22. LUBE OIL CONSOLE
23. DEAERATOR
24. FEEDWATER PUMPS
25. CONDENSATE PUMPS
26. LP/HP PRE-HEATERS
27. VACUUM SYSTEM
28. DIRTY WASTE WATER SUMP, OIL WATER SEPARATOR
29. RAW WATER TANK
30. COMPRESSED AIR SYSTEM
31. GENERATOR CIRCUIT BREAKER
32. WAREHOUSE
33. CHEMICAL INJECTION SKID
34. MAIN AUXILIARY TRANSFORMERS
35. GENERATOR STEP-UP TRANSFORMERS
36. EMERGENCY DIESEL GENERATOR
37. COOLING TOWER
38. FREE FOR USE
39. FIRE AND SERVICE WATER TANK
40. SERVICE WATER PUMPS
41. DEMINERALIZED WATER PUMPS
42. FIRE PROTECTION PUMPS
43. GENERATOR
44. BLOWDOWN TANKS
45. TURBINE DRAINS TANK
46. CONDENSATE TANK
47. STG PEECC
48. AUXILIARY BOILER
49. AIR COOLED CONDENSER
50. HTF PIPING CONNECTION TO SOLAR FIELD
51. SAMPLE PANEL & LAB BUILDING
52. DEMINERALIZED WATER TANK
53. CHEMICAL FEED CANOPY
54. WATER TREATMENT AREA
55. ADMINISTRATION BUILDING
56. CONTROL BUILDING
57. HIGH VOLTAGE LINE
58. SUS TRANSFORMER & 480 V BUS
59. TAKE OFF TOWER
60. PIPE RACK
61. RECYCLE BASIN
62. AUXIARY COOLING WATER PUMPS
63. SEPTIC SYSTEM FIELD
64. Waste Water Tredment AREAWASTE WATER TREATMENT AREA
65. CLOSED COOLING WATER HEAT EXCHANGERS
66. CLOSED COOLING WATER PUMPS
67. FREE FOR USE
68. FREE FOR USE
69. FREE FOR USE
70. FREE FOR USE



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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SOLAR MILENNIUM, LLC.

AMARGOSA FARM ROAD SOLAR PROJECT

FIGURE 2-6 DRY COOLING - POWER BLOCK DETAIL

DATE: 01-21-10
DRAFTER: NL
DESIGNER: NL
CHECKED: BDP
PROJECT NO. SML0801.000

FIG. 2-6
SHEET 1 OF 1

2.3.3.4 Cooling Systems

The proposed Project will utilize a dry-cooling system for heat rejection from the steam cycle consisting of a forced draft air-cooled condenser. In the dry-cooled alternative, the auxiliary cooling water system uses a small wet-cooling tower to cool plant auxiliary equipment, including the STG lubrication oil cooler, the STG cooler, steam cycle sample coolers, and large pumps. The water picks up heat from the various equipment items being cooled and *rejects* the heat to the cooling tower. This auxiliary cooling system will allow critical equipment such as the generator and HTF pumps to operate cooler and at their design ratings during hot summer months when the Project's power output is most valuable. An average of 130,000 gallons of water per day (108 acre-feet per year [afy]) will be consumed by the auxiliary cooling water system; the maximum rate of consumption is 197,500 gallons per day in summer. In the wet-cooled alternative, the auxiliary cooling water system circulates cooling water from the main cooling tower.

2.3.3.5 Buildings within the Power Block

The electrical and local control buildings, workshop buildings, and electrical equipment buildings will be located within the power blocks. All buildings will be of pre-engineered metal frame construction and assembled on site. Aceessibility to buildings will be in full compliance with applicable codes and standards including the Americans with Disabilities Act.

Other plant site buildings will include the water treatment building, as well as a number of pre-engineered enclosures for mechanical and electrical equipment. Building columns will be supported on reinforced concrete mat foundations or individual spread footings and the structures will rest on reinforced concrete slabs. The total footprint area of the buildings in each power block is approximately 31,200 square feet.

2.3.4 Electrical System

The Project electrical components consist of the solar field electrical systems, the electrical system within the power blocks, and the Project switchyard. Transmission of power from the proposed Project will be "wheeled" through Valley Electric Association's (Valley Electric) proposed upgraded and existing lines. The proposed point of interconnection will be to a new switchyard to be constructed by Valley Electric near Amargosa Farm Road and Power Line Road adjacent to the power plant. Valley Electric will upgrade the existing distribution and transmission right-of-way that exist between the proposed Project switchyard and the planned Johnnie substation, by adding a new 230 kilovolt (kV) circuit. Valley Electric is responsible for upgrading its transmission system and is preparing a separate Environmental Assessment for that action.

2.3.4.1 Electrical Generation

Roughly 10 percent of the STG output would be used on site for plant auxiliary loads such as motors, heaters, control systems, and general facility loads including lighting and heating, ventilation, and air conditioning. Some of the power needed for on-site uses would be converted from alternating current (AC) to direct current (DC) for power plant control systems and emergency backup systems. Power would be generated by the STG (size and generation voltage is dependent on the final generator selection) and stepped up by a fan-cooled generator step-up transformer.

The steam turbine-generators would electrically connect to a 230kV on-site switchyard. The steam-turbine-generators generate electricity at 18kV. This voltage would be increased ("stepped-up") in the switchyard to 230kV via a generator step-up transformer. The generator step-up transformer would rest on a concrete pad with a perimeter berm designed to contain the transformer insulating oil in the event of a leak or spill.

The plant site switchyard would be located in the southeast corner of the Project site and would require an overhead steel-reinforced, aluminum conductor unit tie line for the connection to each unit's generator step-up transformer. The switchyard would consist of 230kV switchyard circuit breakers with 230kV disconnect switches on each side of the breaker for breaker maintenance.

The switchyard ground grid will be connected to the generation plant ground grid and will consist of copper conductor throughout the yard with ground rods installed around the perimeter and near major equipment. A layer of aggregate will be installed above grade to increase contact resistance within fenced switchyard area.

2.3.4.2 Direct Current Power Supply System

An uninterruptible power system will be provided in each unit. The power system will service emergency lighting, the DCS, electrical breakers, and relays. The DC power system will serve as a temporary bridge to the more robust emergency diesel AC power supply in the event external power is suddenly lost.

2.3.4.3 Essential Service Alternating Current System

A 120-volt essential service AC power distribution system serves critical equipment loads, lighting and alarms, and loads that protect equipment from potential damage in the event of sudden loss of station service. This system is served through an inverter that receives power from the DC power supply system.

2.3.5 Fuel Supply and Use

The auxiliary boiler and HTF heaters will be fueled by propane. Propane will be delivered to the plant site via truck from a local distributor and stored in 18,000-gallon aboveground tanks (one in each power block). The estimated propane usage for the auxiliary boiler per unit for normal

operation is approximately 9 MMBtu/hr overnight and approximately 34 MMBtu/hr for 30 minutes during startup each morning. The estimated maximum propane usage for the HTF heater is an additional 41 MMBtu/hr per unit is for approximately 50 hours per year during the winter.

2.3.6 Water Supply and Use

Under the Proposed Action, the Project would use dry-cooled technology. Water use in a dry-cooled plant would include water for solar collector mirror washing, makeup for the SSG feedwater, dust control, water for cooling plant auxiliary equipment, potable water and fire protection.

2.3.6.1 Water Requirements

The estimated operational water requirements for the power plant are presented in Table 2-3. The average total annual water usage under the dry-cooled option is estimated to be approximately 400 afy, which corresponds to an average flow rate of about 248 gallons per minute. Usage rates will vary during the year and would be higher in the summer months when the peak maximum flow rate could be as much as about 50 percent higher for the ancillary equipment heat rejection process. Equipment sizing would be consistent with peak daily rates to ensure adequate design margin.

Table 2-3 Summary of Operational Water Usage

Rate of Use	Annual Average (afy) Dry-Cooled	Annual Average (afy) Wet-Cooled
Power Cycle Heat Rejection	0	4,409
Power Cycle Makeup Water *	101	101
Mirror Wash Water	200	149
Domestic Potable Water	9	9
Dust Suppression Water	45	33
Ancillary Equipment Heat Rejection	146	0
Totals (rounded)	400	4,600

* Power cycle makeup will be recycled and is not included in the consumptive use total (see Section 2.5.6.3)

2.3.6.2 Water Source

The water needs for the proposed Project will be met by one of two options: 1) leasing and conveying groundwater from three existing wells located on private land southwest of the Project site; or 2) purchasing existing water rights from the three wells, and moving the point of diversion to the power block areas.

The 3 wells under consideration have associated water rights totaling 1,323 afy. It is expected that the 3 wells will adequately serve the proposed Project (under the dry-cooled alternative) on a rotating basis without exceeding their annual pumping average. It is anticipated that 2 wells will be the primary source of water, while the third well would provide redundancy, an inherent backup water supply in the event of outages or maintenance of the other wells. Location and annual duty associated with each well is listed in Table 2-4.

Table 2-4 Project Wells

Application No.	Certificate No.	Location	Annual Duty (afy)[1]	6-year Average Pumpage (afy)[1]
15702	6444	NE ¼ SE ¼ Sec 14, T16S, R48E	175.00	145.83
15893	5717	NE ¼ NE ¼ Sec 23, T16S, R48E	545.38	288.18
43873	12460	SW ¼ NW ¼ Sec 24, T16S, R48E	603.00	502.50
		Totals	**1,323.38**	**936.51**

[1]One acre-foot equals 325,851 gallons
Source: Nevada Division of Water Resources (NDWR) 2009a

For the lease option, a new pipeline will be constructed from existing points of diversion to the project site. Pipeline diameters will vary by need and would be sized upon final engineering design. It is estimated pipeline sizes will range from 8 to 14 inches, depending upon the required flows. The pipeline route would be on private land adjacent to, and within the proposed right-of-way. A main waterline line will be constructed from existing point of diversion (certificate 5717), located approximately 50 feet southwest of the northeast section corner of Section 23, Township 16 South, Range 48 East. The line will depart the point of diversion (across a private right-of-way) and head in a northeasterly direction approximately 100 feet to fall within the proposed project right-of-way; it will then head in a northerly direction to the project power blocks, assembly hall and office building. Redundant waterlines from points of diversion (certificate nos. 12460 and 6444) will be constructed and tied to the main line previously described. Applications will be filed for a change in place of use and manner of use through the NDWR for a portion of the certificated water rights, totaling 400 afy.

For the purchase option, a portion of the certificated water rights (totaling 400 afy) would be moved to new points of diversion. The new points of diversion would be located at the north end of each power block. The Proponent would apply for a change in the point of diversion, place of use, and manner of use through the Nevada Division of Water Resources (NDWR).

2.3.6.3 Water Treatment

For uses requiring treated water, the groundwater will first be treated by reverse osmosis (RO) or an electrodialysis reversal (EDR) process in a single treatment unit prior to being directed to a water storage tank. Up to three covered water tanks would be constructed on site. These include

a RO concentrate/dust control storage tank totaling 750,000 to 1.1 million gallons of capacity, and two treated water storage tanks, one at each power block, each totaling 250,000 to 600,000 gallons. Each tank will be a vertical, cylindrical, field-erected steel tank supported on foundations consisting of either a reinforced concrete mat or a reinforced concrete ring wall with an interior bearing layer of compacted sand supporting the tank bottom.

Water used for power cycle feedwater makeup, mirror washing, ancillary equipment heat rejection, and domestic uses would require treatment for reduction of total dissolved solids (TDS). This type of treatment process is known as demineralization, and can be accomplished by either distillation processes (evaporation/condensation) or membrane processes such as RO or EDR. Since TDS concentrations are known to be high in Amargosa Valley, it is unlikely that thermal processes would be cost effective in this area. Accordingly, only membrane processes are considered here. Since RO and EDR produce similar product water quality and waste streams, further discussion here will reference only RO for simplicity. Selection of the process to be used at the Project would be made during the final design process.

Membrane demineralization processes split the feed stream into two streams: (1) a product water stream (permeate) with reduced salinity and (2) a concentrate stream containing the majority of the salts that were in the feed stream. Desalination processes are usually designed to operate with the highest safe recovery (recovery is the fraction of feed water recovered as permeate) in order to minimize water loss, since the concentrate would normally be considered a waste stream. In this case, the highest safe recovery is 92 percent.

In order to provide the demineralized water quality needed for power cycle makeup, it would be necessary to use ion exchange demineralization as a final treatment step after RO. Ion exchange demineralization can be done using either permanently installed equipment or portable demineralizers. Permanently installed equipment requires regeneration on site, which requires storage and disposal of significant quantities of sulfuric acid and sodium hydroxide (caustic). Alternatively, portable demineralizers are taken off-site for regeneration at the supplier's facility, so no on-site storage of chemicals and disposal of regeneration wastes is required. Off-site regeneration is proposed for the Project. This would eliminate the need to store regeneration chemicals on site and minimize on-site production of hazardous wastes. These demineralizers would be provided as forklift-moveable fiberglass bottles that would be traded out when exhausted and returned to the supplier for regeneration. Demineralization systems would be installed at each power block to minimize piping and provide the best water quality.

The steam purity specification is based on the VGB *Guidelines for Feedwater, Boiler Water, and Steam Quality for Power Plants/Industrial Plants* R450Le, issued in 2004. It is anticipated that all of the power-cycle make-up water will be recycled and reused as feed to the RO system. This would reduce the salinity of the RO feed and improve the RO recovery.

Because of the very low TDS of the makeup to the ancillary equipment heat rejection cooling tower, it is expected that blowdown would not be required. Rather, drift (windblown mist) would provide the necessary salt removal. If blowdown is required, it would be recycled to the RO system. It may be more advantageous to recycle the power cycle makeup water to the ion exchange demineralizer rather than to the RO. This modification will be evaluated during final design.

If used as a potable water source, water from the site groundwater wells may require treatment to meet public health requirements for domestic potable water supplies. The Proponent would use a desalination process for water treatment. Following desalination, the water would require addition of chlorine to prevent growth of pathogenic organisms. A Public Water System Permit for a non-community water system would be obtained from the NDEP – Bureau of Safe Drinking Water (NRS 445, NAC 445A, 450 through 445A.6731).

2.3.6.4 Water Needs during Construction

Water needs for construction related activities include:

- Dust control for areas experiencing construction work as well as mobilization and demobilization
- Dust control for roadways
- Water for grading activities associated with both cut and fill work
- Water for soil compaction in the utility and infrastructure trenches
- Water for soil compaction of the site grading activities
- Water for soil stockpile sites
- Water for the various building pads
- Water for concrete pours on site

The predominant use of water during construction will be for grading activities, which will occur at a steady rate of work each month. The grading schedule for the site would be spread to cover the total construction period. This will mean that water use will be steady and without definable peaks.

Project construction is expected to occur over a total of 39 months. Average construction water use at the site is estimated to be about 752,000 gallons (about 2.3 afy) per working day. Total construction water use for the duration of the Project is estimated to be about 600 afy (1,950 over the 39 month construction period). Construction water will be sourced from wells within close proximity to the site and piped to the site for use by the contractor. Potable water during construction will be brought to the site in trucks and held in day tanks. Temporary easements on private land will be in place for the duration of the construction period for access to water wells.

2.3.6.5 Water Needs during Operations

Water needs during operation for both the wet- and dry-cooled alternatives are summarized in Table 2-3, Summary of Operational Water Use. Cooling constitutes the most significant water use ranging from 4,409 afy for a wet-cooled plant to 146 afy for the dry-cooled alternative. Mirror wash constitutes the second largest water use (200 afy). To facilitate dust and contaminant removal, water from the primary desalination process, RO water, would be used to spray clean the solar collectors on a weekly or as-needed basis, determined by the reflectivity monitoring program. This mirror washing operation is done at night and involves a water truck spraying demineralized water on the mirrors in a drive-by fashion. It is expected that the mirrors will be washed weekly in winter and twice weekly from mid- spring through mid-fall. The mirrors are angled down for washing therefore water does not accumulate on the mirrors. Wash

water falls from the mirrors to the ground and, due to the small volume, soaks in with no appreciable runoff. Remaining rinse water from the washing operation is expected to evaporate on the mirror surface. Power cycle makeup water (101 afy) is water used to make up for leakages and operational cleanliness of the power cycle. This requirement is similar for both the wet- and dry-cooled options. Dust suppression (45 afy) and domestic potable water use (9 afy) are also similar for both the wet-cooled and dry-cooled options.

2.3.7 Waste Generation and Management

Project wastes would be comprised of non-hazardous wastes including solids and liquids and lesser amounts of hazardous wastes and universal wastes. The non-hazardous solid waste would primarily consist of construction and office wastes, as well as liquid and solid wastes from the water treatment system. In the case of the wet-cooled alternative, this waste stream would also include the mineral deposits that concentrate in the evaporative cooling water ponds. The non-hazardous solid wastes would be trucked to the nearest landfill, which is a Class I landfill located in Pahrump with no limit to the amount of daily waste. Alternate disposal location is Las Vegas if a Class II or Class III landfill is required. Non-hazardous liquid wastes would consist primarily of domestic sewage. To manage the non recyclable non-hazardous domestic sewage wastes, a septic tank and leach field would be installed. Process waste water streams include RO system reject water, boiler blowdown, and auxiliary cooling tower blowdown. Boiler blowdown and auxiliary cooling tower blowdown will be recycled to the RO feed water system. All RO system reject water will be used for dust suppression.

2.3.7.1 Hazardous Materials Management

Hazardous materials to be used during construction will include gasoline, diesel fuel, oil, lubricants, paint, and paint-related products (e.g., primer, paint thinner, other solvents). All hazardous materials used during construction and operation would be stored on site in storage tanks/vessels/containers that are specifically designed for the characteristics of the materials to be stored.

Secondary containment structures will be provided around any oil-filled transformers located outdoors, STG lube oil tanks, HTF overflow and expansion vessels and any other oil containing tanks over 55 gallons without double walls or vendor supplied secondary containment. The containment will be sized to contain 125 percent of the fluid in the transformer or vessels with appropriate freeboard required per code. Additional equipment (such as HTF pumps, feedwater pumps, etc.) will be provided with 6-ineh-tall curbs as appropriate.

Both construction and operation-phase hazardous waste will be recycled and reused to the extent possible.

Site-specific, safety-related plans and programs would be developed and implemented to ensure safe handling, storage, and use of hazardous materials (i.e., Hazardous Material Business Plan). Plant personnel would be supplied with appropriate personal protective equipment (PPE) and would be properly trained in the use of PPE and the handling, use, and cleanup of hazardous

materials used at the facility, as well as procedures to be followed in the event of a leak or spill. Adequate supplies of appropriate cleanup materials would be stored on site.

2.3.7.2 Wastewater

The Project will produce two primary wastewater streams:

- Non-reusable sanitary wastewater produced from administrative centers and operator stations.
- Reusable streams including: blowdown from the small ancillary equipment cooling tower for the ancillary equipment heat rejection system; RO reject water, and boiler blowdown.

The amount of non-reusable sanitary wastewater produced is dependent upon the number of people using the facilities, how the water is used (e.g. toilets, showers, kitchen sinks, etc.), and the types of facilities provided (e.g. port-a-johns, low-flush toilets, potable drinking water, etc.). It is anticipated that up to 9 afy will be required for potable water use.

The power generation cycle will not produce cooling tower blowdown because the plant will be dry-cooled. A small auxiliary cooling tower will generate a small amount of blowdown that will be reused on site.

2.3.7.3 Wastewater Treatment

Sanitary wastes produced during construction would be held in chemical toilets and transported off-site for disposal by a commercial chemical toilet service. Any other wastewater produced during construction such as equipment rinse water would be collected by the construction contractor in Baker tanks and transported off-site for disposal in a manner consistent with applicable regulatory requirements.

During operations, sanitary wastes will be collected for treatment in septic tanks and disposed via leach fields located at the power block as well as at the administration and warehouse areas. Smaller septic systems will be provided for the control room buildings to receive sanitary wastes at those locations. Based on the current estimate of 180 employees on a 24-hour, 7 day per week work schedule, a total leach field area of approximately 16,500 square feet would be required. It may be economical and expedient to provide permanent, portable, chemical toilets at remote areas of the operational Project site.

At this time, the leach field is anticipated to be sited adjacent to the bioremediation field. However, the final location will be determined following additional engineering design. The Proponent will coordinate the development of the leach field and bioremediation facility with NDEP as part of their permitting and approval process with that agency.

2.3.8 Bioremediation Unit

The HTF for the solar fields will be diphenyl/biphenyl oxide. Dowtherm A and Solutia VP-1 are commercial products that have been used in concentrated solar trough plants to date. The diphenyl/biphenyl oxide mixture is not classified as a hazardous material by the USDOT, nor is it listed under EPA CERCLA regulations. However, this material, when discarded, may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Aet (RCRA), 40 CFR 261.24, due to its toxicity characteristie.

While the collector design has advanced to an excellent level of performance and reliability, occasional small spills of HTF do oecur, primarily due to equipment failures. Spill management procedures would be implemented to report, contain and clean up any accidental spills. If a line worker or other staff observes a spill or release, the system operators in the power block will be notified and the affected collector loop shut down. An appropriately equipped crew will make any necessary equipment repairs and remove any hazardous wastes to an on-site bioremediation facility that utilizes indigenous bacteria to digest the hydrocarbon contamination.

The two solar fields would share the same bioremediation unit to bio-remediate or land farm soil contaminated from releases of HTF. Each bioremediation facility is expected to comprise an area of about 400 feet by 800 feet (7 acres). The bioremediation facility would utilize naturally occurring bacteria to metabolize hydrocarbons contained in non-hazardous HTF contaminated soil. A combination of nutrients, water, and aeration facilitates the bacterial activity where microbes restore contaminated soil within 2 to 4 months.

2.3.9 Fire Protection

Fire protection systems will be provided to limit personnel injury, property loss, and downtime in the event of a fire. On-site fire protection, designed in conformance with the International Fire Code 2006 edition with Nevada State Fire Marshal Amendments, would be provided for the Project. The system will include a fire protection water system and portable fire extinguishers.

Separate fire flow storage tanks will be sited within each of the two power blocks and an additional storage tank may be required for the Assembly Hall depending upon the final location of the structure. Firewater will be sourced from the three wells to be used for the Project, and will be pumped to the site and stored in tanks for fire suppression. On-site fire pumps will be required to deliver water to the fire protection piping network for each of the buildings located within the power blocks.

The piping network will be configured in a loop so that a piping failure can be isolated with shutoff valves without interrupting water supply to other areas in the loop. Fire hydrants will be placed at intervals throughout the plant site that would be supplied with water from the supply loop. The water supply loop will also supply firewater to a sprinkler deluge system at each unit transformer, HTF expansion tank and circulating pump area and sprinkler systems at the STG and in the administration building.

Fire protection for the solar field will be provided by zoned isolation of the HTF lines in the unlikely event of a rupture that results in a fire. Since vegetation and other combustible materials will not be present in the solar field area, the HTF would be allowed to self extinguish.

In the event additional fire support is needed, the Amargosa Valley Volunteer Fire Department would be contacted. The Amargosa Valley Volunteer Fire Department Station is located at 851 E. Amargosa Farm Road, which is approximately 1.3 miles from the southeast corner of the solar field. If needed, mutual aid would be provided by the Pahrump and Mercury fire departments. Ongoing discussions with Nye County may further define the services provided by the Amargosa Valley Volunteer Fire Department.

A Construction Fire Protection and Prevention Plan will be developed and followed throughout all phases of construction. The permanent facility fire protection system will be put into use during construction as soon as is practicable. Prior to the availability of this system, fire extinguishers and other portable fire-fighting equipment will be available on site. All equipment will be Occupational Safety and Health Administration (OSHA) compliant. Locations of portable firefighting equipment may include portable office spaces, welding areas, flammable chemical areas, and vehicles and other mobile equipment.

2.3.10 Telecommunications and Telemetry

The Project will have telecommunications service from providers who serve the Amargosa Valley area. Voice and data communications will be supported by a fiber optic system. This will be augmented with wireless telecom equipment, particularly to support communication with Project staff dispersed throughout the large Project site.

With respect to telemetry, the Project will utilize electronic systems to control equipment and facilities operations over a large site. Detailed information on Projeet use of the electronic spectrum has not yet been developed at the current stage of the Project engineering design process.

2.3.11 Lighting System

Project operation would require on-site nighttime lighting for safety and security. To reduce off-site lighting effects, lighting at the facility would be restricted to areas required for safety, security, and operation. Exterior lights would be hooded, and lights would be directed on-site so that light or glare would be minimized in deference to the "dark skies" initiatives that strive to protect views of night skies.

Low-pressure sodium lamps and fixtures of a non-glare type would be specified. Switched lighting would be provided for areas where continuous lighting was not required for normal operation, safety, or security; this would allow these areas to remain unlit most of the time, thereby minimizing the amount of lighting potentially visible off-site. AC lighting will be the primary form of illumination, but DC lighting will be included for activities or emergency egress required during an outage of the plant's AC system.

2.3.12 Roads, Fencing, and Security

The Project site has existing access from Amargosa Farm Road. However, it is antieipated that construction traffic, including equipment and workers, will access the Project site from an alternative access road. Construetion of this access road may be performed by Nye County and will require additional consultation with the BLM and NDOT.

Alternative access routes to the Project site are shown on Figure 1-2 and inelude access:

- From US 95, south along an extension of the T&T Road to the Project site; approximately 5 miles in length
- From US 95, southerly along Valley View Boulevard to Amargosa Farm Road. The proposed Project right-of-way is 0.5 miles east of the interseetion of Valley View Boulevard and Amargosa Farm Road.
- From NV 373, westerly along Anvil Road, approximately 4 miles to Powerline Road, thence north along Powerline Road, 1 mile to the proposed Project right-of-way.

Amargosa Farm Road is an existing public roadway maintained by Nye County Public Works. The roadway consists of 24 feet of asphalt/concrete pavement and roadside ditches on both sides. Amargosa Farm Road would be realigned, either 250 feet or 0.25 miles south of the existing roadway, based on final engineering design. The proposed roadway alignment will be coordinated with Nye County Public Works and be reconstructed in conformance with current standards.

The locations of the principal site entry gates for both the construction and the commercial operating period will be evaluated in consultation with the BLM, NDOT and Nye County Public Works to ensure ingress and egress from the site does not have adverse impacts on existing traffic flow patterns.

Only a small portion of the overall plant site will be paved; primarily the site access road, the service roads to the power blocks, and portions of the power block (paved parking lot and roads encircling the STG and SSG areas). The remaining portions of the power block will be gravel surfaced. The solar field will remain unpaved and without a gravel surface in order to prevent rock damage from mirror wash vehiele traffic; an approved dust-suppression coating will be used on the dirt roadways within and around the solar field. Roads and parking areas located within the power block area and adjacent to the administration building and warehouse will be paved with asphalt.

The solar field and support facilities perimeter will be secured with a combination of chain-link and wind fencing. Chain-link, metal-fabrie security fencing, 8-feet tall, with 1-foot barbed wire (or razor wire) on top will be installed along the north and south sides of the facilities. Thirty-foot-tall wind fencing comprised of A-frames and wire mesh will be installed along the east and west sides of each solar field. The wind fence would be designed to serve two purposes; protect the solar field from blowing dust and sand, and to partially screen the solar facilities from surrounding properties. Controlled access gates will be located at the site entrance.

2.3.13 Temporary Construction Workspace, Yards, Staging Areas

An assembly hall will be built for storage of equipment and for field fabrieation facilities. This building, located south of the Amargosa Road realignment, may become permanent depending on the need for additional permanent warehouses for spare parts or maintenance work. Indoor storage space will be required only for weather sensitive items such as control/electrical panels, or small parts that could easily be misplaced. Some space for material requiring temperature and humidity control will be provided. Other items will be stored outdoors on raised platforms with proper covers or temporary shelters. Construction-area lighting will be provided at the warehouse locations. At the areas designated on the site laydown plan, construction subcontractors will provide their own warehousing facilities needed for their materials.

In addition to the permanent plant roads and parking, construction roads and parking will be required to provide access to construction facilities and the laydown area. Construction parking space will be provided near the construction office complex. These temporary roads will be all-weather, gravel surfaced; have sufficient width; and be effectively located to accommodate high-efficiency construction traffic. The parking area will have barriers to control parking patterns. The construction parking area will accommodate approximately 400 vehicles.

2.3.14 Site Drainage and Earthwork

The existing topographic conditions of the Project site show an average slope of approximately 1 foot in 200 feet (0.5 percent) and generally sloping in a southwesterly direction. The site consists of desert shrub and is traversed by numerous defined, intermittent, and braided washes within the Fortymile Wash watershed. The Fortymile Wash consists of an approximate 330-square-mile drainage area measured to the southern property line of the Project site. The section of the Fortymile Wash impacting the site is considered alluvial, based on site field investigation and review of aerial photography. The apex of the Fortymile Wash is clearly identifiable approximately 0.5 mile north of US 95. Under existing conditions, three primary discharge locations along the southern property boundary are apparent. It is the objective of the Project's stormwater management plan to perpetuate discharge at these three historic locations.

The site will be graded generally following the existing contours of the site in order to minimize the amount of disturbance and to allow a balanced distribution of material. Flood protection of the property from off-site flows will be provided by means of a continuous concrete lined channel around the northern and western perimeter of the site. The channel will be designed to effectively intercept the 100-year storm event off-site runoff and convey the concentrated flow to the southwest corner of the property. The southwest corner of the property has been identified as one of the historic discharge locations of the Fortymile Wash. The channel will discharge within the property limits and energy dissipation facilities will be provided in order to disperse the concentrated flow back to a shallow sheet flow condition prior to leaving the property boundary.

Additionally, a concrete lined channel is proposed along the eastern side of the solar field, inside the fence line, in order to intercept and collect flows impacting the site from the east (see Figures 2-1 through 2-4). Similar to the Fortymile Wash ehannel, the concentrated flow will be released on the property in its historic location and an energy dissipation facility will be provided in order

to return the flow to a shallow sheet flow condition prior to leaving the property. Perimeter channels are recommended to be concrete lined due to the high velocity potential and for maintenance reasons. Offsite flows will be intercepted and conveyed around the site to ensure no direct contact with on-site stormwater runoff.

Due to the size of the solar field area, the site itself has potential to generate large storm flows during a rain event. For this reason, stormwater control facilities will be constructed to protect on-site facilities, and to convey stormwater runoff to historic discharge locations in both quantity and manner of flow.

The four primary (major) onsite channels, traversing the site north to south, provide 100-year event stormwater runoff interception from four equal divisions of the entire project site. The two power block areas are considered to contain the most sensitive equipment on the site and are therefore each located along one of the primary channels; thus achieving flood protection during a 100-year storm event. The stormwater runoff generated between the primary channels will be collected in a series of swales and small channels that will direct the flow to the appropriate primary channel.

All minor channels within each section will be designed to intercept and convey the 25-year storm event. Stormwater runoff in areas between the primary channels and in excess of the 25-year event will consist of sheet flow (shallow depth, low velocity) below the solar panel systems; and eventually be intercepted by an appropriate primary channel prior to impacting a power block area. This concept was selected in order to reduce costs for on-site drainage facilities, while still providing desired flood protection.

All primary channels are recommended as concrete lined. Concrete lined channels have been proposed for the following reasons: 1) to achieve channel reliability and integrity; 2) to provide a means for routine maintenance and sediment deposition removal; and 3) to achieve necessary channel width in conformance with the site design space limitations. Various culvert facilities will be utilized to convey storm flow below essential on-site and off-site roads for access and movement around the site.

In addition to conveyance facilities, an on-site detention basin is considered necessary in order to limit post-development flows to pre-development limits. Onsite storm flows will pass through the detention basin prior to off-site discharge, providing a facility for suspended particles to settle.

In order to reduce impacts from off-site stormwater runoff, a regional flood control alternative was presented to the BLM and Nye County staff. The alternative would provide a regional off-site detention basin at the apex of the Fortymile Wash located north of US 95 and_would effectively and considerably reduce existing condition peak storm flow downstream of US 95. Reducing off-site peak flows impacting the site allow for reduction in size of perimeter flood control facilities necessary for protection of the Project site. All properties downstream of the detention basin would benefit from this approach. This alternative is being evaluated by both BLM and Nye County staff.

The power blocks will generally drain by sheet flow or swales to the nearest detention basin. The basins will be designed to retain for a short duration prior to outfall to the nearest primary

channel. Oil and chemical storage areas within the power locks will have their own containment features.

The preliminary site grading plan is designed to be balanced; no import or export of soil is expected for general earthwork. When the geotechnical investigation report is available for the site, the grading plan will be adjusted to account for any loss in elevation that could occur. Engineered fill will be provided as required for equipment and structure foundations if recommended by the geotechnical report. Only soil material that has been approved by the BLM, in consultation with a licensed geotechnical engineer will be used for structural fill. Additionally, granular material may need to be imported for the use as road base and possible use below foundations. Grading of the site will commence at the beginning of the construction period and last over a period of approximately 24 months. Such an extended grading period will require less water on a daily basis for grading operations as well as for dust control over a smaller area. The total earth movement required is estimated to be approximately 9,345,000 cubic yards.

During construction and operation, a comprehensive system of management controls, including permanent and temporary site-specific Best Management Practices (BMP), to minimize stormwater contact with contaminants and sediment transport would be implemented. An NOI application and Stormwater Pollution Prevention Plan (SWPPP) in accordance with the State of Nevada, National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit NVR 100000 will be filed with the NDEP prior to the initiation of any construction activities. The SWPPP will utilize BMPs for the environmental control of stormwater discharges to off-site areas that may be attributed to Project activities. The SWPPP will contain a comprehensive procedure for inspecting and repairing BMPs. The management controls may include:

- Erosion and sediment control BMPs during construction activities such as silt fence, straw waddles, gravel bags, dust control, inlet protection, and sediment traps
- Employee training program
- Good housekeeping programs
- Preventive maintenance programs
- Structural BMPs:
    - Temporary containment during maintenance activities
    - Permanent erosion and sediment control BMPs such as detention/sediment basin, diversion berms, riprap stabilization, concrete lined channels, and energy dissipation devices
    - Permanent secondary containment structures at chemical storage and process areas
- Materials, equipment and vehicle management practices
- Spill prevention and response programs
- Inspection programs

2.3.15 Construction Schedule, Manpower, and Sequencing

Construction will be managed by Solar Millennium. Several dozen major and minor subcontractors will be hired to undertake the myriad of mechanical, civil and electrical construction tasks. Prior to mobilization for construction, a detailed construction plan will be

developed to define the construction supervisory and technical field organizations and staffing levels required for the Project. Major milestones of the planned eonstruction schedule are as follows:

- Begin construction: fourth quarter 2010
- Unit #1 start of eommercial operations: mid 2013
- Unit #2 start of commercial operations: by mid 2014

Project construction is expected to occur over a total of 39 months. The Proponent would phase construction so that the first power plant would be operational approximately 1 year before the second plant becomes operational. Project construction will require an average of 650 employees over the entire 39-month construction period, with manpower requirements peaking at approximately 1,300 workers in Month 17 of construction. The construction workforce will consist of a range of laborers, craftsmen, supervisory personnel, support personnel, and management personnel. Chapter 3.9 – Socioeconomics provides a breakdown of the construction workforce by skill over the entire construction period.

Temporary construction parking areas will be provided within the power plant site adjacent to the laydown area. The plant laydown area will be used throughout the build out of the two solar units. The construction sequence for plant construction includes the following general steps:

- Site Preparation: This includes detailed construction surveys, mobilization of construction staff, grading, and preparation of drainage features. Grading for the solar field, power block, and drainage channels will be completed during the first 24 months of the construction schedule. Pre-construction survey work will consist of staking/flagging right-of-way and site area boundaries, work areas (permanent and short term), cut and fill staking, access and roads, transmission structure centers, foundation structure staking, and desert tortoise/endangered plants offsets. Staking/flagging will be maintained until final cleanup or reclamation.

- Linears: This includes the site access road and telecommunication line. The site access road and telecommunication line will be constructed during the first 6 months of the construction schedule in conjunction with site-preparation activities.

- Foundations: This includes excavations for large equipment, footings for the solar field, and ancillary foundations in the power block.

- Major Equipment Installation: Once the foundations are complete, the larger equipment will be installed. The solar field components will be assembled in an on-site erection facility and installed on their foundations.

- Balance of Plant: With the major equipment in place, the remaining fieldwork will be piping, electrical, and smaller component installations.

- Testing and Commissioning: Testing of subsystems will be conducted as they are completed. Major equipment will be tested once all supporting subsystems are installed and tested.

2.3.16 Operations and Maintenance

While electrical power is to be generated only during daylight hours, the Project will be staffed 24 hours a day, 7 days per week. A total estimated workforce of 100 full-time employees will be needed to staff the first phase of the project (Unit #1). When the second of the 2 units comes online, the full-time staff will increase to 180. The operations workforce would consist of plant operators and maintenance technicians working 12-hour shifts, and administrative personnel working 8-hour shifts per day.

Maintenance activities during operations will include daily inspection of field components, condition assessment of critical equipment, and routine lubrication of equipment. Some specialized maintenance would be performed by the equipment provider or other specialist contractors. Long-term maintenance would be performed against a defined service and replacement schedule.

Mirror washing is done at night and involves a water truck spraying treated water on the mirrors in a drive-by fashion. It is expected that the mirrors will be washed weekly in winter and twice weekly from mid- spring through mid-fall.

Under normal circumstances, the plant switchyard would be controlled remotely, and routine inspections by personnel would occur on a monthly basis or as needed under emergency conditions. In addition, all of the switchyard structures will be inspected from the ground on an annual basis for corrosion, misalignment, and foundation condition. Ground inspection will include the inspection of hardware, insulator keys, and conductors. This inspection will also check conductors and fixtures for corrosion, breaks, broken insulators, and bad splices.

Road maintenance would be performed as needed. Paved roads would be swept, sealed, and/or overlaid as needed. Grading and drainage would be maintained for gravel and earthen roads.

2.3.17 Decommissioning

The lifespan of the proposed Project is expected to span at least 30 years. At the end of the Project's useful lifespan, the facilities will either be repowered or decommissioned. Due to the excellent solar resource at the Project site, repowering is a viable option. This may involve replacing the existing parabolic troughs with components that are more efficient, thereby extending the useful lifespan of the Project. Decommissioning will adhere to the requirements of appropriate governing authorities and will be in accordance with all applieable federal, state, and local permits, including any reclamation requirements BLM specifically adopts for utility-scale solar projects. For this particular site, the decommissioning process will involve steps to dismantle and remove equipment, stabilize soil and drainages, and regrade and reshape features as necessary. Consistent with BLM requirements, a detailed decommissioning plan would be developed in a manner that both protects public health and safety and is environmentally acceptable.

2.4 Wet-Cooled Alternative

Under the wet-cooled alternative, the Proponent would construct and operate two 242 MW solar thermal power plants and ancillary facilities. Construction and operation of a wet-cooled project would be similar to a dry-cooled plant. Plant components and layout are similar under both the wet- and dry-cooled alternatives; the primary differences being the amount of water used for plant operations, the need for cooling towers for heat rejection from the steam cycle (see section 2.5.3.4), and the need for evaporation ponds. Table 2-2 lists the plant components for both the wet- and dry-cooled alternatives.

Water use in a wet-cooled plant would inelude water needed for the cooling tower to cool the steam cycle; water for solar collector mirror washing; makeup for the SSG feedwater; dust control, potable water and fire protection. The average total annual water usage for the wet-cooled alternative is estimated to be approximately 4,600 afy. The estimated operational water requirements for a wet-cooled plant are presented in Table 2-3. Under the wet-cooled alternative, the 3 wells identified for use in under the dry-cooled alternative, would supply a portion of the water required for operations. However, additional water supplies would be required under the wet-cooled alternative. The source of this additional water would be dependent on the availability of other water rights available for lease or sale in the Amargosa Desert Hydrographic Basin.

The wet-cooling alternative has performance advantages over the dry-cooling alternative offering approximately 11 MW greater electrical output during peak summer ambient temperature conditions. The performance of the wet-cooled alternative is enhanced because wet-cooling relies primarily on evaporative cooling to remove heat from the circulating water. In contrast, a dry-cooled alternative uses convective heat transfer, which operates similar to a car's radiator. In the dry-cooled alternative, an air cooled condenser using a large array of fans that force air over finned tube heat exchangers cools the steam turbine-generator exhaust steam. The disadvantages of dry-cooling are higher capital costs, higher auxiliary operating power requirements and an overall lower plant performance, especially on hot days, when the peak power is needed most. A dry-cooled plant provides about 5 percent less electric energy on an annual basis than a wet-cooled plant, because of reduced performance on hot summer days. The electricity cost for a dry-cooled plant is approximately 6 to 9 percent higher than for a wet-cooled plant. Thus dry-cooling of a trough plant minimizes water use, but at a 6 to 9 percent cost penalty.

2.5 No Action Alternative

NEPA regulations require that EIS alternative analyses "include the alternative of no action" (40 CFR 1502.14[d]). The No Action alternative must be included in analysis according to CEQ regulations so that the EIS clearly evaluates the consequences between the alternative methods of developing the proposed Project and the option of no development. The No Action Alternative provides a useful baseline for comparison of the environmental effects of the other alternatives. For this analysis, no action means that the BLM would reject Solar Millennium's proposal and the right-of-way as requested would not be approved or authorized.

Because the Project facilities would not exist, potential adverse environmental effects would not occur. However, it is important to also note that any beneficial effects such as reduced fossil fuel use would also not occur.

2.5.1 Agency-Preferred Alternative

The BLM is awaiting public input before making a decision on a preferred alternative. The environmental consequences of the Proposed Action and Alternatives are summarized and compared in Table 2-5 below.

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
Air Quality and Climate – Sections 3.1 and 4.1		
Direct effects on air quality would occur from earthmoving activity during construction (fugitive dust, PM_{10} and $PM_{2.5}$) and tailpipe emissions from heavy construction equipment and worker vehicles (PM, NOx, SO_2, CO, and VOC). The Proponent would comply with Federal and State air quality standards. Particulate emissions during construction would be temporary and mitigated through adherence to the recommended mitigation measures. Operation of the solar power plant would not result in increases of Potential for Significant Deterioration emission levels in the regional area. The facility is not considered a major stationary source with potential to cause significant air quality impacts. The Project's operation would not cause new violations of any NO_2, SO_2, $PM_{2.5}$ or CO ambient air quality standards.	Direct effects on air quality would occur from earthmoving activity during construction (fugitive dust, PM_{10} and $PM_{2.5}$) and tailpipe emissions from heavy construction equipment and worker vehicles (PM, NOx, SO_2, CO, and VOC). The Proponent would comply with Federal and State air quality standards. Particulate emissions during construction would be temporary and mitigated through adherence to the recommended mitigation measures. Operation of the solar power plant would not result in increases of Potential for Significant Deterioration emission levels in the regional area. The facility is not considered a major stationary source with potential to cause significant air quality impacts. The Project's operation would not cause new violations of any NO_2, SO_2, $PM_{2.5}$ or CO ambient air quality standards.	Direct effects on air quality would occur from earthmoving activity during construction (fugitive dust, PM_{10} and $PM_{2.5}$) and tailpipe emissions from heavy construction equipment and worker vehicles (PM, NOx, SO_2, CO, and VOC). The Proponent would comply with Federal and State air quality standards. Particulate emissions during construction would be temporary and mitigated through adherence to the recommended mitigation measures. Operation of the solar power plant would not result in increases of Potential for Significant Deterioration emission levels in the regional area. The facility is not considered a major stationary source with potential to cause significant air quality impacts. The Project's operation would not cause new violations of any NO_2, SO_2, $PM_{2.5}$ or CO ambient air quality standards.
Geological Hazards and Mineral Resources – Sections 3.2 and 4.2		
The Proposed Action would not result in impacts to geological	The Proposed Action would not result in impacts to	The Proposed Action would not

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
resources. However, seismic activity and ground subsidence in the region could potentially impact structures constructed and operated under the Proposed Action. All project components and facilities would be constructed in accordance with applicable regulations, engineering protocols, and safety standards to minimize potential impacts from seismic activity. The Proposed Action would not result in impacts to mineral resources, as no active claims, mines, or quarries are present within the Project area.	geological resources. However, seismic activity and ground subsidence in the region could potentially impact structures constructed and operated under the Proposed Action. All project components and facilities would be constructed in accordance with applicable regulations, engineering protocols, and safety standards to minimize potential impacts from seismic activity. The Proposed Action would not result in impacts to mineral resources, as no active claims, mines, or quarries are present within the Project area.	result in impacts to geological resources. However, seismic activity and ground subsidence in the region could potentially impact structures constructed and operated under the Proposed Action. All project components and facilities would be constructed in accordance with applicable regulations, engineering protocols, and safety standards to minimize potential impacts from seismic activity. The Proposed Action would not result in impacts to mineral resources, as no active claims, mines, or quarries are present within the Project area.
Soils – Sections 3.3 and 4.3		
Direct impacts to soil resources associated with construction activities under the Proposed Action include increased water- and wind-induced soil erosion from within the Project area. No soils capable of supporting Prime Farmland would be impacted by the Proposed Action. There would be no impacts to soil resources as a result of operation or maintenance of the components or facilities under the Proposed Action. Site-specific best management practices to minimize soil erosion and sedimentation would be implemented during construction and operations. The selected erosion and sediment control best management practices and environmental protection measures would be based on the type of disturbance expected, soil type, and the location of the site relative to sensitive resources.	Direct impacts to soil resources associated with construction activities under the Proposed Action include increased water- and wind-induced soil erosion from within the Project area. No soils capable of supporting Prime Farmland would be impacted by the Proposed Action. There would be no impacts to soil resources as a result of operation or maintenance of the components or facilities under the Proposed Action. Site-specific best management practices to minimize soil erosion and sedimentation would be implemented during construction and operations. The selected erosion and sediment control best management practices and environmental protection measures would be based on the type of disturbance expected,	Direct impacts to soil resources associated with construction activities under the Proposed Action include increased water- and wind-induced soil erosion from within the Project area. No soils capable of supporting Prime Farmland would be impacted by the Proposed Action. There would be no impacts to soil resources as a result of operation or maintenance of the components or facilities under the Proposed

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action	**Wet-Cooled Alternative**	**No Action Alternative**
	soil type, and the location of the site relative to sensitive resources.	Action. Site-specific best management practices to minimize soil erosion and sedimentation would be implemented during construction and operations. The selected erosion and sediment control best management practices and environmental protection measures would be based on the type of disturbance expected, soil type, and the location of the site relative to sensitive resources.
Water Resources – Sections 3.4 and 4.4		
Under the Proposed Action (dry-cooled alternative), the demand for operational water would be 400 acre-feet per year (afy). The proposed source of the water is three existing wells, currently producing approximately 1300 afy. With either a wet- or dry-cooled option, water rights will be acquired from an existing water right owner(s), and converted from irrigation use to industrial use. The section of the Fortymile Wash that traverses the Project area will be rechanneled and designed to intercept the 100-year storm event and convey the concentrated flow to historic discharge locations south of the Project site. The Proponent is coordinating these activities with the BLM, Nye County, and the USACE. Potential impacts to water resources during construction would be primarily associated with surface disturbing activities, but could also be a result of accidental spills and handling and storage of hazardous chemicals. Mitigation measures are proposed to prevent spills of	Under the Proposed Action (dry-cooled alternative), the demand for operational water would be 400 acre-feet per year (afy). The proposed source of the water is three existing wells, currently producing approximately 1300 afy. With either a wet- or dry-cooled option, water rights will be acquired from an existing water right owner(s), and converted from irrigation use to industrial use. The section of the Fortymile Wash that traverses the Project area will be rechanneled and designed to intercept the 100-year storm event and convey the concentrated flow to historic discharge locations south of the Project site. The Proponent is coordinating these activities with the BLM, Nye County, and the USACE. Potential impacts to water resources during construction would be primarily associated with	Under the Proposed Action (dry-cooled alternative), the demand for operational water would be 400 acre-feet per year (afy). The proposed source of the water is three existing wells, currently producing approximately 1300 afy. With either a wet- or dry-cooled option, water rights will be acquired from an existing water right owner(s), and converted from irrigation use to industrial use. The section of the Fortymile Wash that traverses the Project area will be rechanneled and designed to intercept the 100-

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
chemicals, as well as to respond to spills should they occur.	surface disturbing activities, but could also be a result of accidental spills and handling and storage of hazardous chemicals. Mitigation measures are proposed to prevent spills of chemicals, as well as to respond to spills should they occur.	year storm event and convey the concentrated flow to historic discharge locations south of the Project site. The Proponent is coordinating these activities with the BLM, Nye County, and the USACE. Potential impacts to water resources during construction would be primarily associated with surface disturbing activities, but could also be a result of accidental spills and handling and storage of hazardous chemicals. Mitigation measures are proposed to prevent spills of chemicals, as well as to respond to spills should they occur.
Noise – Sections 3.5 and 4.5		
Throughout the construction of the proposed Project, temporary noise impacts are expected to briefly radiate within the defined boundaries of the project site. Under Environmental Protection Agency (EPA) guidelines for outdoor noise impacts to residential property lines, the noise impacts are considered to be less than significant and no mitigation will be required for the temporary construction operations. Operational activities of the Proposed Action were evaluated to determine the worst-case daily operational noise impacts. Under EPA noise threshold guidelines, the impacts were found to be less than significant and require no mitigation.	Throughout the construction of the proposed Project, temporary noise impacts are expected to briefly radiate within the defined boundaries of the project site. Under Environmental Protection Agency (EPA) guidelines for outdoor noise impacts to residential property lines, the noise impacts are considered to be less than significant and no mitigation will be required for the temporary construction operations. Operational activities of the Proposed Action were evaluated to determine the worst-case daily operational	Throughout the construction of the proposed Project, temporary noise impacts are expected to briefly radiate within the defined boundaries of the project site. Under Environmental Protection Agency (EPA) guidelines for outdoor noise impacts to residential property lines, the noise impacts are considered to be less than significant and no

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action	**Wet-Cooled Alternative**	**No Action Alternative**
Employees working within the operational areas may be exposed to areas considered as a sensitive noise receptor location. Under Occupational Safety and Health Administration (OSHA) Standards the impact of worst-case calculated noise exposure levels the impacts is considered less than significant.	noise impacts. Under EPA noise threshold guidelines, the impacts were found to be less than significant and require no mitigation. Employees working within the operational areas may be exposed to areas considered as a sensitive noise receptor location. Under Occupational Safety and Health Administration (OSHA) Standards the impact of worst-case calculated noise exposure levels the impacts is considered less than significant.	mitigation will be required for the temporary construction operations. Operational activities of the Proposed Action were evaluated to determine the worst-case daily operational noise impacts. Under EPA noise threshold guidelines, the impacts were found to be less than significant and require no mitigation. Employees working within the operational areas may be exposed to areas considered as a sensitive noise receptor location. Under Occupational Safety and Health Administration (OSHA) Standards the impact of worst-case calculated noise exposure levels the impacts is considered less than significant.
Biological Resources – Sections 3.6 and 4.6		
VEGETATION RESOURCES: Potential direct impacts to vegetation resources associated with construction activities would include clearing and grubbing of approximately 4,350 acres of creosote bush-dominated native vegetation for the duration of the proposed Project life, and the potential to introduce or spread non-native weeds already present in the Project area or brought in by contaminated vehicles. No potential habitats for federally listed threatened or endangered plant species occur within the Project area; however, two state	VEGETATION RESOURCES: Potential direct impacts to vegetation resources associated with construction activities would include clearing and grubbing of approximately 4,350 acres of creosote bush-dominated native vegetation for the duration of the proposed Project life, and the potential to introduce or spread non-native weeds already present in the Project area or brought in by contaminated vehicles.	VEGETATION RESOURCES: Potential direct impacts to vegetation resources associated with construction activities would include clearing and grubbing of approximately 4,350 acres of creosote bush-dominated native vegetation for the duration of the proposed Project life, and the potential to

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
protected cacti species are present and would need to be salvaged in accordance with NRS 527.060-120. Indirect impacts to vegetation resources include soil compaction, changes to soil structure by use of dust suppression, spread of non-native weeds already present in the Project area and brought in by contaminated vehicles, and changes in the distribution of precipitation falling on the solar fields. WILDLIFE RESOURCES: Direct impacts on wildlife resources can result from ground disturbance caused by construction-related activities, which can impact wildlife habitat by removing vegetation, altering plant composition or structure (e.g. non-native invasive species replacing native species), causing fragmentation, loss of connectivity for wildlife, increased predation, and altering soil characteristics. Pre-construction clearance surveys would be conducted to ensure that activities associated with the construction and operation of the Project would not cause mortality to individuals. Mortality could also occur from collisions with equipment and vehicles. Predation could increase as construction displaces wildlife from protected cover to uncovered habitat. Removal of vegetation, alteration of Fortymile Wash, and placement of fencing around parameter of the solar fields, could impede travel opportunities for wildlife. The Project area contains low quality, but suitable habitat for Desert Tortoise. Four old Class IV burrows were located within the Project area. Efforts will be made to ensure that the area is clear of any active burrows and all live tortoises prior to any construction being conducted. Direct impacts on migratory birds could result from ground disturbance during construction. Construction activities may impact suitable habitat for nesting and burrowing birds including Burrowing Owl, a BLM Sensitive species and a Nevada animal species considered to be at risk in all counties in Nevada. Old burrowing Owl burrows	No potential habitats for federally listed threatened or endangered plant species occur within the Project area; however, two state protected cacti species are present and would need to be salvaged in accordance with NRS 527.060-120. Indirect impacts to vegetation resources include soil compaction, changes to soil structure by use of dust suppression, spread of non-native weeds already present in the Project area and brought in by contaminated vehicles, and changes in the distribution of precipitation falling on the solar fields. WILDLIFE RESOURCES: Direct impacts on wildlife resources can result from ground disturbance caused by construction-related activities, which can impact wildlife habitat by removing vegetation, altering plant composition or structure (e.g. non-native invasive species replacing native species), causing fragmentation, loss of connectivity for wildlife, increased predation, and altering soil characteristics. Pre-construction clearance surveys would be conducted to ensure that activities associated with the construction and operation of the Project would not cause mortality to individuals. Mortality could also occur from collisions with equipment and vehicles. Predation could increase as construction displaces wildlife from protected cover to uncovered habitat. Removal of vegetation, alteration of Fortymile Wash, and placement of fencing around parameter of the solar fields, could impede travel opportunities for wildlife. The Project area contains low quality, but suitable habitat for Desert Tortoise. Four old Class IV burrows	introduce or spread non-native weeds already present in the Project area or brought in by contaminated vehicles. No potential habitats for federally listed threatened or endangered plant species occur within the Project area; however, two state protected cacti species are present and would need to be salvaged in accordance with NRS 527.060-120. Indirect impacts to vegetation resources include soil compaction, changes to soil structure by use of dust suppression, spread of non-native weeds already present in the Project area and brought in by contaminated vehicles, and changes in the distribution of precipitation falling on the solar fields. WILDLIFE RESOURCES: Direct impacts on wildlife resources can result from ground disturbance caused by construction-related activities, which can impact wildlife habitat by removing vegetation, altering plant composition or

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
were found in the Project area. For other nesting bird species, direct impacts could include eliminating potential nesting habitat and loss of individuals. The Migratory Bird Treaty Act (MBTA) applies to species that would be impacted during the construction phase of the Project. Other sensitive species observed within the Project area include Prairie Falcon and LeConte's Thrasher. There would be direct impacts to LeConte's Thrasher by eliminating suitable nesting habitat. Direct impacts on Desert Tortoise can result from loss of tortoise habitat; including loss of old burrow sites, located in the northwest quarter of the Project area. Permanent loss of native vegetation would directly impact at least 12 snake and lizard species that were found in the Project area. Two such species include, Desert Iguana, included on the Nevada Natural Heritage Program Animal Watch List, and Nevada Shovel-nosed Snake, included as a conservation priority species in Nevada. Under the Proposed Action, the Proponent would purchase or lease existing water rights and convert the type of water use from current agricultural use to industrial use. As such, the proposed Project would not increase pumping in the hydrographic basin. Using the best available model and a conservative assumption that Project pumping would add to, rather than replace existing pumping impacts to water levels in Devils Hole were determined to be negligible. Therefore, indirect impacts from groundwater pumping to Devils Hole and associated sensitive wildlife species are also presumed to be negligible.	were located within the Project area. Efforts will be made to ensure that the area is clear of any active burrows and all live tortoises prior to any construction being conducted. Direct impacts on migratory birds could result from ground disturbance during construction. Construction activities may impact suitable habitat for nesting and burrowing birds including Burrowing Owl, a BLM Sensitive species and a Nevada animal species considered to be at risk in all counties in Nevada. Old burrowing Owl burrows were found in the Project area. For other nesting bird species, direct impacts could include eliminating potential nesting habitat and loss of individuals. The Migratory Bird Treaty Act (MBTA) applies to species that would be impacted during the construction phase of the Project. Other sensitive species observed within the Project area include Prairie Falcon and LeConte's Thrasher. There would be direct impacts to LeConte's Thrasher by eliminating suitable nesting habitat. Direct impacts on Desert Tortoise can result from loss of tortoise habitat; including loss of old burrow sites, located in the northwest quarter of the Project area. Permanent loss of native vegetation would directly impact at least 12 snake and lizard species that were found in the Project area. Two such species include, Desert Iguana, included on the Nevada Natural Heritage Program Animal Watch List, and Nevada Shovel-nosed Snake, included as a conservation priority species in Nevada. Under the Proposed Action, the Proponent would purchase or lease existing water rights and convert the type of water use from current agricultural use to industrial use. As such, the proposed Project would not	structure (e.g. non-native invasive species replacing native species), causing fragmentation, loss of connectivity for wildlife, increased predation, and altering soil characteristics. Pre-construction clearance surveys would be conducted to ensure that activities associated with the construction and operation of the Project would not cause mortality to individuals. Mortality could also occur from collisions with equipment and vehicles. Predation could increase as construction displaces wildlife from protected cover to uncovered habitat. Removal of vegetation, alteration of Fortymile Wash, and placement of fencing around parameter of the solar fields, could impede travel opportunities for wildlife. The Project area contains low quality, but suitable habitat for Desert Tortoise. Four old Class IV burrows were located within the Project area. Efforts will be made to ensure that the area is clear of any active burrows and all live tortoises prior to any construction being conducted. Direct impacts on migratory

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
	increase pumping in the hydrographic basin. Using the best available model and a conservative assumption that Project pumping would add to, rather than replace existing pumping impacts to water levels in Devils Hole were determined to be negligible. Therefore, indirect impacts from groundwater pumping to Devils Hole and associated sensitive wildlife species are also presumed to be negligible.	birds could result from ground disturbance during construction. Construction activities may impact suitable habitat for nesting and burrowing birds including Burrowing Owl, a BLM Sensitive species and a Nevada animal species considered to be at risk in all counties in Nevada. Old burrowing Owl burrows were found in the Project area. For other nesting bird species, direct impacts could include eliminating potential nesting habitat and loss of individuals. The Migratory Bird Treaty Act (MBTA) applies to species that would be impacted during the construction phase of the Project. Other sensitive species observed within the Project area include Prairie Falcon and LeConte's Thrasher. There would be direct impacts to LeConte's Thrasher by eliminating suitable nesting habitat. Direct impacts on Desert Tortoise can result from loss of tortoise habitat; including loss of old burrow sites, located in the northwest quarter of the Project area. Permanent loss of native vegetation would directly impact

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
		at least 12 snake and lizard speeies that were found in thc Projeet area. Two sueh speeies inelude, Desert Iguana, ineluded on the Nevada Natural Heritage Program Animal Wateh List, and Nevada Shovel-nosed Snake, ineluded as a eonservation priority speeies in Nevada. Under the Proposed Aetion, the Proponent would purehase or lease existing water rights and eonvert the type of water use from current agrieultural use to industrial use. As sueh, the proposed Projeet would not inerease pumping in the hydrographie basin. Using the best available model and a eonservative assumption that Projeet pumping would add to, rather than replaee existing pumping impaets to water levels in Devils Hole were determined to be negligible. Therefore, indireet impacts from groundwater pumping to Devils Hole and assoeiated sensitive wildlife speeies are also presumed to be negligible.

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
Historic and Cultural Resources – Sections 3.7 and 4.7		
Sixteen cultural resource sites were identified within the Area of Potential Effects of the Proposed Action. Only one site has been determined eligible for listing on the National Register of Historic Places (NRHP) under Criterion D. Direct effects to this site could occur as a result of ground disturbing activities associated with the construction of the proposed Project. An Historic Properties Treatment Plan describing the mitigation measures that would be employed to resolve any adverse effect to the one NRHP eligible site would be prepared. It is anticipated that any potential direct impacts from Project construction would be fully mitigated through data recovery. If previously unidentified cultural resources, human remains, or funerary items are discovered during Project activities, the procedures outlined in the BLM Nevada State Protocol Agreement would be implemented.	Sixteen cultural resource sites were identified within the Area of Potential Effects of the Proposed Action. Only one site has been determined eligible for listing on the National Register of Historic Places (NRHP) under Criterion D. Direct effects to this site could occur as a result of ground disturbing activities associated with the construction of the proposed Project. An Historic Properties Treatment Plan describing the mitigation measures that would be employed to resolve any adverse effect to the one NRHP eligible site would be prepared. It is anticipated that any potential direct impacts from Project construction would be fully mitigated through data recovery. If previously unidentified cultural resources, human remains, or funerary items are discovered during Project activities, the procedures outlined in the BLM Nevada State Protocol Agreement would be implemented.	Sixteen cultural resource sites were identified within the Area of Potential Effects of the Proposed Action. Only one site has been determined eligible for listing on the National Register of Historic Places (NRHP) under Criterion D. Direct effects to this site could occur as a result of ground disturbing activities associated with the construction of the proposed Project. An Historic Properties Treatment Plan describing the mitigation measures that would be employed to resolve any adverse effect to the one NRHP eligible site would be prepared. It is anticipated that any potential direct impacts from Project construction would be fully mitigated through data recovery. If previously unidentified cultural resources, human remains, or funerary items are discovered during Project activities, the procedures outlined in the BLM Nevada State Protocol Agreement would be implemented.

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
Paleontological Resources – Sections 3.8 and 4.8		
No previously discovered paleontological localities have been identified within the Project area. However, a geological unit with an undetermined potential for containing significant paleontological resources was identified within the Project area. The probability is low that construction activities under the Proposed Action may result in the exposure of paleontological resources in this geological unit, which consists of marl deposits that represent Pleistocene spring deposits. There would be no impacts to paleontological resources as a result of operation or maintenance of the components or facilities under the Proposed Action.	No previously discovered paleontological localities have been identified within the Project area. However, a geological unit with an undetermined potential for containing significant paleontological resources was identified within the Project area. The probability is low that construction activities under the Proposed Action may result in the exposure of paleontological resources in this geological unit, which consists of marl deposits that represent Pleistocene spring deposits. There would be no impacts to paleontological resources as a result of operation or maintenance of the components or facilities under the Proposed Action.	No previously discovered paleontological localities have been identified within the Project area. However, a geological unit with an undetermined potential for containing significant paleontological resources was identified within the Project area. The probability is low that construction activities under the Proposed Action may result in the exposure of paleontological resources in this geological unit, which consists of marl deposits that represent Pleistocene spring deposits. There would be no impacts to paleontological resources as a result of operation or maintenance of the components or facilities under the Proposed Action.
Socioeconomic Resources – Sections 3.9 and 4.9		
Construction of the proposed Project would last 39 months. Construction is expected to directly create an average of about 650 annual full-time employment (FTEs) over 39 months, with a peak monthly employment of about 1,300 FTEs. This direct employment will create both indirect and induced secondary employment in the regional area. For all projects in the region, temporary housing	Construction of the proposed Project would last 39 months. Construction is expected to directly create an average of about 650 annual full-time employment (FTEs) over 39 months, with a peak monthly employment of about 1,300 FTEs. This direct employment will create both indirect and induced	Construction of the proposed Project would last 39 months. Construction is expected to directly create an average of about 650 annual full-time employment (FTEs) over 39

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
facilities would be needed and the added population during construction could place a burden on local social and public services. The construction payroll has been estimated at approximately $68.8 million annually. Capital expenditures and local spending on construction materials and equipment within the ROI are estimated to total approximately $47.1 million annually. During construction, the proposed Project would generate up to $34 million for Nye County in property taxes, and pay approximately $45 million in sales tax to the State of Nevada for the Local School Support Tax. During operation, it is expected that the annual purchases for materials supplies, equipment, and services within the ROI would total approximately $6.0 million. For example, if all purchases are made within Nye County, which has a current tax rate of 7.1 percent, these expenditures would generate approximately $355,000 in annual sales tax revenue.	secondary employment in the regional area. For all projects in the region, temporary housing facilities would be needed and the added population during construction could place a burden on local social and public services. The construction payroll has been estimated at approximately $68.8 million annually. Capital expenditures and local spending on construction materials and equipment within the ROI are estimated to total approximately $47.1 million annually. During construction, the proposed Project would generate up to $34 million for Nye County in property taxes, and pay approximately $45 million in sales tax to the State of Nevada for the Local School Support Tax. During operation, it is expected that the annual purchases for materials supplies, equipment, and services within the ROI would total approximately $6.0 million. For example, if all purchases are made within Nye County, which has a current tax rate of 7.1 percent, these expenditures would generate approximately $355,000 in annual sales tax revenue.	months, with a peak monthly employment of about 1,300 FTEs. This direct employment will create both indirect and induced secondary employment in the regional area. For all projects in the region, temporary housing facilities would be needed and the added population during construction could place a burden on local social and public services. The construction payroll has been estimated at approximately $68.8 million annually. Capital expenditures and local spending on construction materials and equipment within the ROI are estimated to total approximately $47.1 million annually. During construction, the proposed Project would generate up to $34 million for Nye County in property taxes, and pay approximately $45 million in sales tax to the State of Nevada for the Local School Support Tax. During operation, it is expected that the annual purchases for materials supplies, equipment, and services within the ROI would total approximately $6.0 million. For example, if all

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
		purchases are made within Nye County, which has a current tax rate of 7.1 percent, these expenditures would generate approximately $355,000 in annual sales tax revenue.
Environmental Justice – Sections 3.10 and 4.10		
Potential direct and indirect impacts associated with the Proposed Action would not have a disproportionate effect on low-income or minority populations. There are no special issues, such as housing, transportation, access, or resource use in the Project area that would affect the environmental justice population disproportionately.	Potential direct and indirect impacts associated with the Proposed Action would not have a disproportionate effect on low-income or minority populations. There are no special issues, such as housing, transportation, access, or resource use in the Project area that would affect the environmental justice population disproportionately.	Potential direct and indirect impacts associated with the Proposed Action would not have a disproportionate effect on low-income or minority populations. There are no special issues, such as housing, transportation, access, or resource use in the Project area that would affect the environmental justice population disproportionately.
Land Use, Recreation, Transportation and Access – Sections 3.11 and 4.11		
LAND USE: Construction and operation of the Proposed Action would permanently disturb approximately 4,350 acres, and would make this acreage unavailable to be developed for other uses. No residential, commercial, or industrial land uses would be directly impacted by construction or operation of the proposed Project. TRANSPORTATION AND ACCESS: The proposed Project would have short-term impacts on traffic flows and volumes on area roadways. Increased construction traffic on local unimproved roads may contribute to road deterioration. No access to commercial or residential areas would be restricted; however	LAND USE: Construction and operation of the Proposed Action would permanently disturb approximately 4,350 acres, and would make this acreage unavailable to be developed for other uses. No residential, commercial, or industrial land uses would be directly impacted by construction or operation of the proposed Project. TRANSPORTATION AND ACCESS: The proposed Project would have short-term impacts on traffic flows and volumes on area roadways. Increased construction traffic on local unimproved	LAND USE: Construction and operation of the Proposed Action would permanently disturb approximately 4,350 acres, and would make this acreage unavailable to be developed for other uses. No residential, commercial, or industrial land uses would be directly impacted by construction or operation of

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative

Proposed Action	Wet-Cooled Alternative	No Action Alternative
construction activity could potentially delay users' daily commute times within the Valley's transportation network. Operation of the Proposed Action would have long-term, cumulative impacts on traffic flows and volumes on roadways when combined with the other proposed energy projects and the commercial activity associated with increased industry in the area. All disturbance areas not covered by project facilities would be reclaimed in accordance with BLM protocols. RECREATION and SPECIAL MANAGEMENT AREAS: The proposed Project would not preclude the use of recreation and special management areas, but would remove land currently available for dispersed recreation on the Project site. Operation and maintenance of the Project facilities would not limit public access to recreation opportunities in the surrounding area.	roads may contribute to road deterioration. No access to commercial or residential areas would be restricted; however construction activity could potentially delay users' daily commute times within the Valley's transportation network. Operation of the Proposed Action would have long-term, cumulative impacts on traffic flows and volumes on roadways when combined with the other proposed energy projects and the commercial activity associated with increased industry in the area. All disturbance areas not covered by project facilities would be reclaimed in accordance with BLM protocols. RECREATION and SPECIAL MANAGEMENT AREAS: The proposed Project would not preclude the use of recreation and special management areas, but would remove land currently available for dispersed recreation on the Project site. Operation and maintenance of the Project facilities would not limit public access to recreation opportunities in the surrounding area.	the proposed Project. TRANSPORTATION AND ACCESS: The proposed Project would have short-term impacts on traffic flows and volumes on area roadways. Increased construction traffic on local unimproved roads may contribute to road deterioration. No access to commercial or residential areas would be restricted; however construction activity could potentially delay users' daily commute times within the Valley's transportation network. Operation of the Proposed Action would have long-term, cumulative impacts on traffic flows and volumes on roadways when combined with the other proposed energy projects and the commercial activity associated with increased industry in the area. All disturbance areas not covered by project facilities would be reclaimed in accordance with BLM protocols. RECREATION and SPECIAL MANAGEMENT AREAS: The proposed Project would not

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action	**Wet-Cooled Alternative**	**No Action Alternative**
		preclude the use of recreation and special management areas, but would remove land currently available for dispersed recreation on the Project site. Operation and maintenance of the Project facilities would not limit public access to recreation opportunities in the surrounding area.
Visual Resources – Sections 3.12 and 4.12		
Visual impacts would occur during the construction of the proposed project based on the introduction of construction equipment, higher levels of traffic, potential fugitive dust, and new forms of night lighting in the foreground distance zone of high sensitivity residential viewers along Sandy Lane and adjacent to Valley View Estates. Long term impacts would be based on the introduction of moderate/strong visual contrast associated with Project components (e.g. solar troughs, power block, transmission lines, and ancillary buildings) within a rural to natural setting that would be visible to moderate and high sensitivity viewers. The majority of long term impacts are anticipated to range from low to moderate based on the relatively low profile of the project and the occurrence of various existing landscape features (i.e. topography, ornamental vegetation, and structures associated with the town of Amargosa Valley) that would screen the project and reduce contrast from moderate and high sensitivity viewers. Limited occurrences of high impacts would occur where moderate to high sensitivity viewers would have unobstructed views of the project in the foreground distance zone (i.e. Sandy Lane and Valley View Estates residences). Compliance is anticipated with BLM Visual Resource Management (VRM) Class IV objectives.	Visual impacts would occur during the construction of the proposed project based on the introduction of construction equipment, higher levels of traffic, potential fugitive dust, and new forms of night lighting in the foreground distance zone of high sensitivity residential viewers along Sandy Lane and adjacent to Valley View Estates. Long term impacts would be based on the introduction of moderate/strong visual contrast associated with Project components (e.g. solar troughs, power block, transmission lines, and ancillary buildings) within a rural to natural setting that would be visible to moderate and high sensitivity viewers. The majority of long term impacts are anticipated to range from low to moderate based on the relatively low profile of the project and the occurrence of various existing landscape features (i.e. topography, ornamental vegetation, and structures associated with the town of Amargosa Valley) that would screen the project and reduce contrast from moderate and high sensitivity viewers. Limited occurrences of high impacts would occur where moderate to high sensitivity viewers would have unobstructed views of	Visual impacts would occur during the construction of the proposed project based on the introduction of construction equipment, higher levels of traffic, potential fugitive dust, and new forms of night lighting in the foreground distance zone of high sensitivity residential viewers along Sandy Lane and adjacent to Valley View Estates. Long term impacts would be based on the introduction of moderate/strong visual contrast associated with Project components (e.g. solar troughs, power block, transmission lines, and ancillary buildings) within a rural to natural setting that would be visible to moderate and high sensitivity viewers. The majority of long term

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action	**Wet-Cooled Alternative**	**No Action Alternative**
	the project in the foreground distance zone (i.e. Sandy Lane and Valley View Estates residences). Compliance is anticipated with BLM Visual Resource Management (VRM) Class IV objectives.	impacts are anticipated to range from low to moderate based on the relatively low profile of the project and the occurrence of various existing landscape features (i.e. topography, ornamental vegetation, and structures associated with the town of Amargosa Valley) that would screen the project and reduce contrast from moderate and high sensitivity viewers. Limited occurrences of high impacts would occur where moderate to high sensitivity viewers would have unobstructed views of the project in the foreground distance zone (i.e. Sandy Lane and Valley View Estates residences). Compliance is anticipated with BLM Visual Resource Management (VRM) Class IV objectives.
Hazardous Materials and Waste – Sections 3.13 and 4.13		
Potential wastes that could be generated at the site include domestic non-hazardous solid waste, hazardous wastes or materials, and used wastes that can be recycled. These types of substances, materials, and wastes most likely would be present during stages of construction, development, and operation of the facility. During all stages of plant construction and operation, strict compliance with all Federal, state, and local regulations governing the management of hazardous	Potential wastes that could be generated at the site include domestic non-hazardous solid waste, hazardous wastes or materials, and used wastes that can be recycled. These types of substances, materials, and wastes most likely would be present during stages of construction, development, and operation of the facility. During all stages of plant construction and operation, strict compliance with all Federal, state, and	Potential wastes that could be generated at the site include domestic non-hazardous solid waste, hazardous wastes or materials, and used wastes that can be recycled. These types of substances, materials, and wastes most likely would be

Table 2-5 Summary of Impacts by Resources for the Amargosa Farm Road Solar Energy Project Proposed Action, Wet-Cooled Alternative, and No Action Alternative		
Proposed Action	**Wet-Cooled Alternative**	**No Action Alternative**
materials is required by law.	loeal regulations governing the management of hazardous materials is required by law.	present during stages of eonstruction, development, and operation of the faeility. During all stages of plant eonstruetion and operation, striet eomplianee with all Federal, state, and loeal regulations governing the management of hazardous materials is required by law.

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CHAPTER 3 - AFFECTED ENVIRONMENT

This chapter describes the affected environment associated with the construction and operation of the proposed Project. The affected environment is the physieal area that bounds the environmental, sociological, economic, or cultural features of interest that could be impacted by the Proposed Action or alternatives. When preparing this EIS, the best available information was used to describe existing environments and the proposed facilities and activities. The information serves as a baseline from which to identify and evaluate environmental changes resulting from construction and operation of the proposed Project. The baseline conditions, for the purposes of analysis, are the conditions that currently exist.

In the following sections, the term "Project area" refers to the area that eneompasses the proposed right-of-way and associated project components, such as the access roads and wells, as well as the area immediately adjacent to the proposed facilities. The study area, or Region of Influence (ROI), varies depending on the resource being analyzed and the predicted locations of direct and indirect impacts from the Proposed Action or alternatives. The Area of Potential Effects (APE), as used in the Cultural and Historic Resources section, is synonymous with the Project area.

Based on consideration of the issues raised during the public scoping process, as well as guidance from the NEPA and related statutes, the following resources are considered in the evaluation of the Proposed Action and alternatives:

- Air Quality
- Geological Hazards and Mineral Resources
- Soil Resources
- Water Resources
- Noise
- Vegetation Resources
- Wildlife Resources
- Paleontological Resources
- Cultural and Historic Resources
- Socioeconomic Resources
- Environmental Justice
- Land Use, Recreation, Transportation and Access
- Visual Resources
- Hazardous and Solid Waste

3.1 Air Quality and Climate

This section describes the existing meteorological and air quality conditions in and around the proposed Project and existing emission sources. Air quality data were obtained from existing literature, agency files, and meteorological data from local monitoring stations.

In Nevada, air quality management areas typically comprise a valley, a portion of a valley, or a terminal basin. The air quality ROI for the proposed Project incorporates portions of Nye County in Nevada and portions of the Death Valley National Park in Inyo County, California, within the Amargosa Desert Hydrographic Basin #230.

3.1.1 Regulatory Framework

Pursuant to the federal Clean Air Act of 1970, 42 USC 7401 et seq. as amended in 1990, the EPA has established primary and secondary National Ambient Air Quality Standards (NAAQS) for criteria pollutants. The criteria pollutants under NAAQS include ozone (O_3), nitrogen dioxide (NO_2), lead (Pb), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter. The Nevada air quality standards are the same as the NAAQS, with the exception of a more restrictive CO standard in locations with a ground elevation above 5,000 feet. Table 3-1 lists the national and State of Nevada standards.

Two subsets of particulate matter are inhalable particulate matter (particulate matter less than 10 microns [PM_{10}] and partieulate matter less than 2.5 microns [$PM_{2.5}$]). The PM_{10} regulation was established by the Clean Air Act. Sources of PM_{10} within the Project vicinity include:

- stationary point sources, such as fuel combustion and industrial processes
- fugitive sources, such as roadway dust from paved and unpaved roads
- wind erosion from open land
- transportation sources, such as automobiles

Recently, the EPA implemented revised standards for particulate matter. The prior standard for PM_{10} was revised, and new standards were added for $PM_{2.5}$. The requirement that agencies demonstrate attainment of the new standards has affected the current emission standards for combustion and fugitive dust sources.

O_3 is not emitted directly into the atmosphere from emission sources; it is produced through photochemical (light catalyzed) reactions in the atmosphere involving hydrocarbons and nitrogen oxides, known generically as O_3 precursors. Because O_3 formation results from large-scale atmospheric processes, O_3 formation and transport is a regional concern, and not directly associated with individual, localized sources of pollution. In 2008, the EPA promulgated new O_3 standard, and as of January 2010, are considering changes to the standard which will be more stringent.

CO is an odorless, invisible gas usually formed as the result of incomplete combustion of organic substances. The primary sources of CO are motor vehicles and stationary combustion sources. Secondary sources include aircraft emissions and agricultural and/or forest burning. CO is more of a localized pollution issue, due to its ability to react in the atmosphere under normal conditions. However, during those periods when the air is stagnant, such as with a ground-based inversion, local levels of CO can increase. Such inversions are caused when a layer of colder air at higher elevations traps relatively warmer air near the ground, preventing normal air circulation.

Table 3-1 National and State of Nevada Ambient Air Quality Standards						
		Nevada Standards[A]		National Standards[B]		
Pollutant	**Averaging Time**	**Concentration[C]**	**Method[D]**	**Primary[C, E]**	**Secondary[C, F]**	**Method[G]**
Ozone	1 hour	0.12 ppm (235 μg/m^3)	Ultraviolet absorption	1 hour equals 0.12 ppm (235 μg/m^3) 8 hours equal 0.08 ppm	Same as primary	Chemiluminescence
Ozone Lake Tahoe Basin, #90	1 hour	0.10 ppm (195 μg/m^3)				
Carbon monoxide less than 5,000′ amsl	8 hours	9 ppm (10,500 μg/m^3)	Nondispersive infrared photometry	9 ppm (10 mg/m^3)	None	Nondispersive infrared photometry
At or greater than 5,000′ amsl		6 ppm (7,000 μg/m^3)				
Carbon monoxide at any elevation	1 hour	35 ppm (40,500 μg/m^3)		35 ppm (40 mg/m^3)		
Nitrogen dioxide	Annual arithmetic mean	0.053 ppm (100 μg/m^3)	Gas phase chemiluminescence	0.053 ppm (100 μg/m^3)	Same as primary	Gas phase chemiluminescence
Sulfur dioxide	Annual arithmetic mean	0.030 ppm (80 μg/m^3)	Ultraviolet fluorescence	0.030 ppm	None	Spectrophotometry (Pararosaniline method)
	24 hours	0.14 ppm (365 μg/m^3)		0.14 ppm		
	3 hours	0.5 ppm (1,300 μg/m^3)		None	0.5 ppm	
Particulate 50 μg/m^3 matter	Annual arithmetic	50 μg/m^3	High-volume PM10 sampling	50 μg/m^3	Same as	High-volume PM_{10} sampling

Table 3-1 National and State of Nevada Ambient Air Quality Standards

		Nevada Standards[A]		National Standards[B]		
Pollutant	**Averaging Time**	**Concentration[C]**	**Method[D]**	**Primary[C, E]**	**Secondary[C, F]**	**Method[G]**
as PM_{10}	mean				primary	
	24 hours	150 μg/m³		150 μg/m³		
Lead	Quarterly arithmetic mean	1.5 μg/m³	High-volume sampling, acid extraction, and atomic absorption spectrometry	1.5 μg/m³	Same as primary	High-volume sampling, acid extraction, and atomic absorption spectrometry
Hydrogen sulfide	1 hour	0.08 ppm (112 μg/m³)G	Ultraviolet fluorescence	—	—	—

Notes:

A – The director shall use the Nevada standards in considering whether to issue a permit for a stationary source and shall ensure that the stationary source will not cause the Nevada standards to be exceeded in areas where the public has access.

B – These standards, other than for ozone, particulate matter, and those based on annual averages, must not be exceeded more than once per year. The 1-hour ozone standard is attained when the expected number of days per calendar year with a maximum hourly average concentration above the standard is equal to or less than one. The PM_{10} 24-hour standard is attained when there are one or fewer days per calendar year with a 24-hour average concentration above the standard, rounded to the nearest 10 μg/m3. The expected number of days per calendar year is generally based on an average of the number of times the standard has been exceeded per year for the last 3 years. The national standards are to be used in determinations of attainment or nonattainment.

C – Where applicable, concentration is expressed first in units in which it was adopted. All measurements of air quality that are expressed as mass per unit volume, such as micrograms per cubic meter, must be corrected to a reference temperature of 25 degrees Centigrade and a reference pressure of 760 mm of Hg (1,013.2 millibars); *ppm* in this table refers to parts per million by volume, or micromoles of regulated air pollutant per mole of gas; *μg/m³* refers to micrograms per cubic meter.

D – Any reference method specified in accordance with 40 CFR Part 50 or any reference method or equivalent method designated in accordance with 40 CFR Part 53 may be substituted.

E – National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

F – National secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a regulated air pollutant.

G – The ambient air quality standard for hydrogen sulfide does not include naturally occurring background concentrations.

Source: NDEP 2009a

SO_2 is formed during the combustion of sulfur-bearing materials, such as the sulfur in metal ores or fossil fuels.

Nitrogen oxides (NO_X), consisting primarily of nitric oxide (NO) and NO_2, and volatile organic compounds (VOC) emissions readily react in the atmosphere as precursors to O_3 and, to a lesser extent, particulate matter, and are major contributors of acid rain. The NAAQS is specific to NO_2, although total NO_X is usually quantified for emission sources.

Historically, the main sources of Pb emissions are vehicles fueled with leaded gasoline and Pb smelters.

3.1.2 Climate and Meteorology

The region around the Project area has a semiarid climate, with total annual precipitation range of approximately 4 to 10 inches. Mean nighttime and daytime air temperatures typically range from 72 to 93 °F in the summer, and from 34 to 51 °F in the winter. On average, the daily range in temperature change is approximately 18 °F.

The closest weather-monitoring station to the Project is located at the Amargosa Valley Library, located approximately 0.5 mile from the eastern edge of the Project site. Table 3-2 summarizes daily maximum and minimum temperatures, as well as extreme high and low temperatures by month.

Table 3-2 Climate Temperature Data for Amargosa Valley, Nevada

Month	Air Temperature (°F)			Extremes (°F)		Average Number of Days			
						Maximum Temperature		Minimum Temperature	
	Average Max	Average Min	Average	High	Low	≥90°F	≥75°F	≤32°F	≤20°F
Jan	60.1	33.1	45.6	81	12	0.0	0.7	14.7	1.1
Feb	62.8	36.5	49.2	80	20	0.0	1.9	7.1	0.2
Mar	71.0	42.2	56.8	92	25	0.3	12.4	2.1	0.0
Apr	77.4	47.9	63.4	98	31	2.9	19.0	0.2	0.0
May	89.3	58.2	75.2	108	40	16.6	28.3	0.0	0.0
Jun	98.4	66.5	84.2	110	49	26.8	29.9	0.0	0.0
Jul	104.3	74.1	90.4	114	61	30.9	31.0	0.0	0.0
Aug	101.4	71.7	87.4	112	56	30.3	31.0	0.0	0.0
Sep	93.8	62.3	78.4	107	47	22.4	29.6	0.0	0.0
Oct	81.5	51.4	66.1	99	36	6.4	24.5	0.0	0.0
Nov	69.0	40.2	53.7	87	21	0.0	8.0	4.1	0.0
Dec	59.0	32.2	44.5	75	18	0.0	0.3	16.8	0.5

(Period of Record October 1999 to December 2008)
Source: Community Environmental Monitoring Program 2009

Precipitation in the region is influenced by two distinct storm patterns, one occurring in the winter and the other in the summer. Winter precipitation (dominantly snow in the mountains and rain in the valleys) tends to be low intensity and long duration and covers a great area. In contrast, most summer rains, resulting from local convective thunderstorms, are of high intensity and short duration. These storms can generate an abundance of lightning, strong winds, and heavy and rapid precipitation. Table 3-3 summarizes precipitation data (rainfall) for the Amargosa area for the period from October 1999 through December 2008.

Table 3-3 Precipitation Data for Amargosa Valley, Nevada

Month	Monthly Average	Extremes		Average Number of Days of Precipitation				
		Max 10-minute PPT	Max Daily PPT	≥ .01 Inch	≥ 0.1 Inch	≥ 0.25 Inch	≥ 0.5 Inch	≥ 1 Inch
Jan	0.48	0.08	0.70	3.1	1.4	0.7	0.2	0.0
Feb	0.97	0.14	1.74	4.9	2.3	1.4	0.3	0.2
Mar	0.29	0.06	0.57	1.8	0.9	0.4	0.2	0.0
Apr	0.19	0.06	0.75	2.1	0.3	0.1	0.1	0.0
May	0.04	0.11	0.32	0.3	0.1	0.1	0.0	0.0
Jun	0.02	0.03	0.05	0.6	0.0	0.1	0.0	0.0
Jul	0.27	0.26	0.85	1.2	0.6	0.3	0.2	0.0
Aug	0.20	0.37	0.64	1.2	0.3	0.3	0.2	0.0
Sep	0.52	0.12	2.37	1.3	0.8	0.4	0.3	0.1
Oct	0.20	0.09	0.40	2.1	0.5	0.3	0.0	0.0
Nov	0.32	0.07	0.89	1.4	0.7	0.4	0.1	0.0
Dec	0.24	0.05	0.63	2.3	0.5	0.3	0.1	0.0
Total	3.74	0.37	2.37	22.4	8.5	4.9	1.9	0.3

Source: Community Environmental Monitoring Program 2009

Local wind patterns have a strong daily cycle of daytime winds from the south and nighttime winds from the north. Figure 3-1 shows the wind patterns near the proposed Project, and illustrates the fluctuations in data from different heights and times of day.

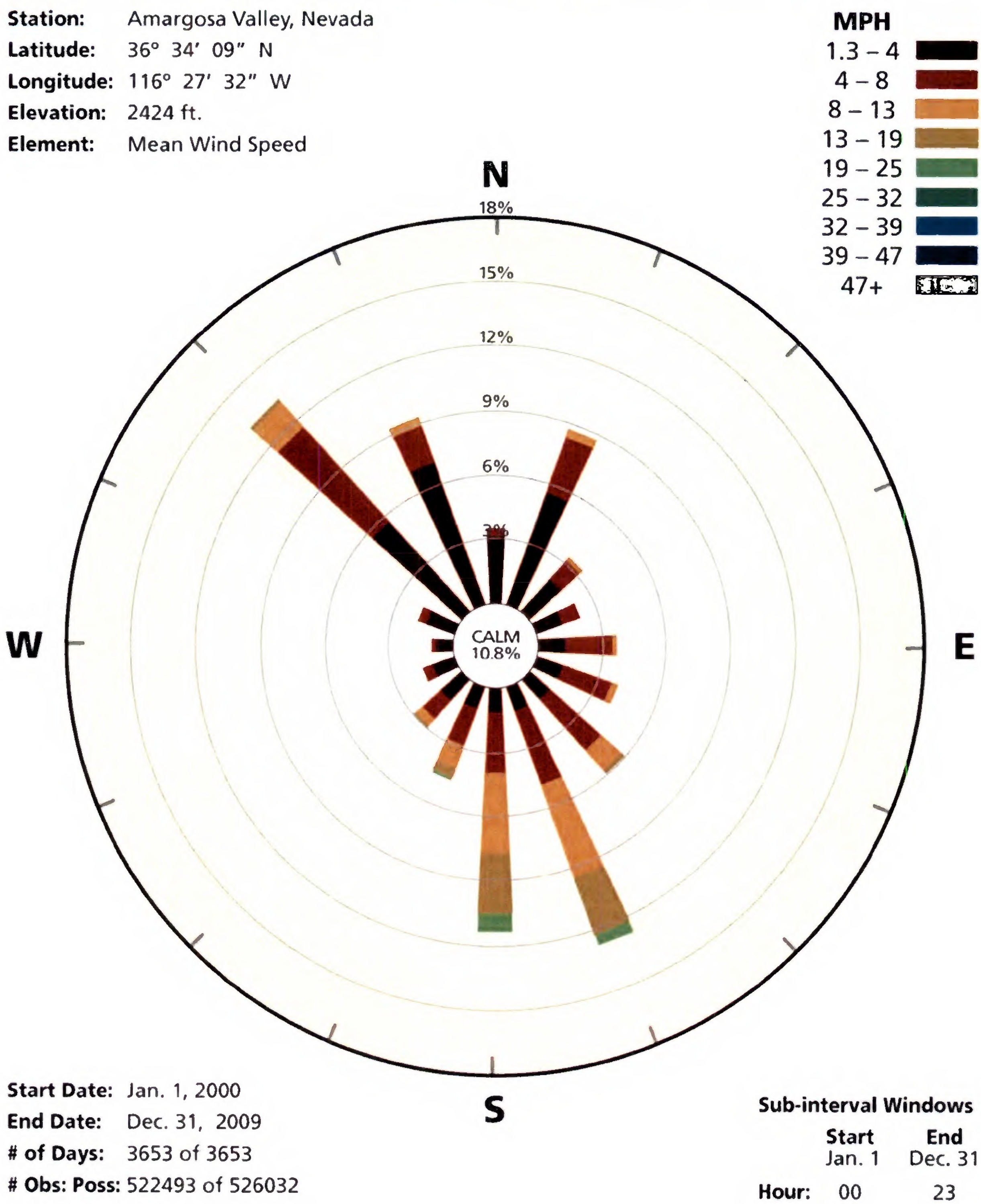


Figure 3-1 Wind Patterns in the Vicinity of the Proposed Project

Table 3-4 summarizes wind speed data for the period from October 1999 through December 2008.

Table 3-4 Wind Speed Data for Amargosa Valley, Nevada							
Month	Average	Max Daily Average	Average Daily Peak Gust	Peak Gust	Average Number of Days Peak Gust		
					≥ 30	≥ 40	≥ 50
Jan	4.4	18.8	17.5	43	3.1	0.1	0.0
Feb	5.1	16.6	19.5	42	3.3	0.6	0.0
Mar	5.4	18.1	20.8	42	3.6	0.3	0.0
Apr	7.2	20.4	25.1	58	9.1	1.0	0.1
May	6.5	19.1	23.8	52	5.4	0.7	0.1
Jun	6.9	22.3	24.3	50	5.8	0.8	0.1
Jul	7.1	14.8	25.7	46	7.9	0.3	0.0
Aug	6.8	15.4	24.2	38	5.7	0.0	0.0
Sep	5.6	19.2	21.9	47	4.6	0.4	0.0
Oct	4.8	17.9	18.6	42	2.5	0.2	0.0
Nov	4.0	19.7	16.6	45	1.3	0.2	0.0
Dec	4.0	16.9	16.5	42	2.5	0.2	0.0
Source: Community Environmental Monitoring Program 2009							

3.1.3 Existing Ambient Air Quality

The primary factors that determine air quality of a region are the locations of the air pollution emission sources, amounts and types of pollutants emitted, and local meteorological conditions over a period of time.

An area is considered to be in nonattainment for a pollutant if it has violated the NAAQS (generally, more than one exceedance of the NAAQS annually) for that pollutant. Areas in violation of one or more of these standards are called nonattainment areas. If an area has not been designated as nonattainment, and if there are no representative air quality data, the area is listed as unclassifiable. For regulatory purposes, the EPA considers unclassifiable areas to be in attainment. The Project area is located in an unclassifiable area.

Section 176(c)(1) of the Clean Air Act requires federal agencies to ensure that their actions conform to applicable implementation plans for the achievement and maintenance of NAAQS for criteria pollutants. To achieve conformity, a federal action must not contribute to new violations of standards for ambient air quality, increase the frequency or severity of existing

violations, or delay timely attainment of standards in the area of concern (e.g., a state or a smaller air quality region). The EPA general conformity regulations (40 CFR 93, Subpart B) contain guidance for determination of whether a proposed federal action would cause emissions to be above certain levels in locations designated as nonattainment or maintenance areas. By definition, a *maintenance area* is a region that was previously in nonattainment, but the EPA or state has re-designated it as an attainment area, with a requirement to develop a maintenance plan.

The Prevention of Significant Deterioration (PSD) program of the Clean Air Act controls air quality in attainment areas; its goal is to prevent significant deterioration of existing air quality. This program is applicable only to point sources and does not apply to transportation sources. Under the PSD provisions, Congress established a land classification scheme for areas of the country with air quality better than the NAAQS. Under this scheme, Class I allows very little deterioration of air quality, Class II allows moderate deterioration, and Class III allows more deterioration; but within each elassification, the pollution concentrations must not violate any NAAQS.

On August 7, 1977, Congress designated 158 areas in existence as Class I, including national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres. Class II areas are essentially all areas that are not designated Class I by Congress. Class II areas could include rural and urban areas, lands managed by cities or state agencies, and land managed by the federal government that have not been designated as Class I. Death Valley National Park is a Class II designation area. The nearest boundary of Death Valley National Park is approximately 4 miles southwest of the Project area.

Due to the remoteness of the Project area, there are limited air quality data specific to Amargosa Valley. However, air quality data are available for the Yucca Mountain area north of the Project site, and the Pahrump Regional Planning District approximately 30 miles southeast of the Project site. The dominant air pollutant in the regional area is particulate matter. Construction and excavation activities tend to aggravate dust production in the area; however, natural sources of pollution, especially dust accumulating in dry playas, tend to be the dominant source.

While the air quality in most of Nye County is unclassifiable, a portion of the Pahrump Valley is in nonattainment for PM_{10}. Nye County and Pahrump, in cooperation with NDEP, successfully negotiated with the EPA to enter into a Memorandum of Understanding to address the nonattainment classification. The Memorandum requires the parties to prepare a Clean Air Action Plan for the nonattainment portion where rapid growth and development have affected air quality with increased fugitive dust levels. As required by the Memorandum, Nye County has enacted an ordinance to regulate construction and other ground-disturbing activities, and has implemented a mandatory program of Best Practicable Methods for use on all ground disturbances of 0.5 acre or greater (NDEP 2009b).

3.1.4 Existing Emission Sources

There are three primary emission sectors in Nevada: (1) electrical generation; (2) transportation; and (3) residential, commercial, and industrial fuel use. The smaller emission sectors are

industrial processes, agriculture, waste management, fossil fuel industry, and forestry. The NDEP – Bureau of Air Pollution Control (BAPC) has jurisdiction over air quality programs in all counties in the state, with the exception of Clark and Washoe counties. The BAPC only has jurisdiction over fossil-fuel-fired units that generate steam for electrical production in these counties.

NRS 445B.380 requires that a statewide greenhouse gas emissions inventory be prepared and issued by the NDEP, at least every four years beginning in 2008. The emissions inventory must include the origins, types and amounts of greenhouse gases released throughout the State, and all supporting analyses and documentation.

On October 30, 2009, the EPA promulgated Title 40 part 98 – Final Mandatory Reporting of Greenhouse Gases Rule (Federal Register: Volume 74, Number 209; Page 56259-56519). In general, the rule covers sources emitting any of the major greenhouse gases (CO_2, methane, nitrous oxide, hydroflourocarbons, perfluorocarbons, sulphur hexafluoride and other fluorinated gases, including nitrogen trifluoride and hydrofluorinated ethers) in an amount equal to or greater than 25,000 metric tons of greenhouse gas emissions or its equivalent per year. This rule requires that facilities classified as general stationary fuel combustion sources, including electricity generating services (North American Industry Classification System [NAICS] Code 221) report emissions if annual rates equal or exceed 25,000 ton of greenhouse gas. However, the rule does not set specific reporting requirements for electric power generation from solar resources (NAICS code 221110).

The BAPC issues four types of operating permits – Class I, Class II, Class III, and Surface Area Disturbance (SAD). Class I sources are sources that have a potential to emit more than 100 tons of PM_{10}, SO_2, NO_X, CO, or VOCs; Class II sources are sources that have the potential to emit less than 100 tons of PM_{10}, SO_2, NO_X, CO, or VOCs. Class III sources are sources that cannot emit more than 5 tons/year of combined PM_{10}, SO_2, NO_X, and VOCs and may not be subject to federal standards (40 CFR 60, 61, 63), excluding 40 CFR 60 Subpart IIII and JJJJ (Phillip, personal communication, 2009).

SAD sources are Class II sources that only have a surface-area disturbance associated with the site/facility. Surface-area disturbance permits are required if the Project will disturb 5 or more acres of land (Phillip, personal communication, 2009).

There are no PSD sources or Class I sources in the ROI (Amargosa Desert Hydrographic Basin #230). There are several Class II and III sources in Basin 230. These are listed in Table 3-5.

Table 3-5 Permitted Emission Sources in the Amargosa Desert Hydrographic Basin

Facility ID	Permit ID	Class	Company Name	Facility Name
A0519	AP32712457	II	Cind-R-Lite Cinder Cone Mine	Class II – Cinder Cone Mine
A0447	AP14592231	II	Mud Camp Mining Company, LLC	Class II – dba Industrial Mineral Ventures (IMV) Nevada
A0786	AP48122278	II	Alltel Communications, Inc.	Class II – Mt. Schader Cell Site
A0966	AP10412492	II	CR Reward Corporation	Class II – Reward Mine
A0448	AP14592455	II	R.T. Vanderbilt Co., Inc.	Class II – Vanderbilt Minerals
A0467	AP14990924.02	II	Ash Meadows, LLC	Class II – Ash Meadows Project
A0557	AP49530184.02	II	U.S. Ecology Nevada, Inc	Class II – Hazardous Waste Stabilization Unit
A0106	AP14421368	III	Have Welder Will Travel	Class III
A0483	AP16112479	III	Funeral Mountain Ranch	Class III
A1025	AP48122565	III	Alltel Communications, LLC	Class III – Amargosa Valley Cell Site
A0936	AP16292454	II	Death Valley Raceway	SAD – Death Valley Raceway
A0641	AP16292090	II	Tri-state Contracting	SAD – E Street Apartments, LLC
A0771	AP14592261	II	Mud Camp Mining Co., LLC – IMV Nevada	SAD – Ewing Bentonite Mining Area
A0191	AP10412304	II	Barrick Bullfrog, Inc.	SAD – Final Closure of Tailings Pond 3/4
A0229	AP14421142.01	II	Nye County Road Department	SAD – Free Use Gravel Pit
A0801	AP16292295	II	TSS Investments, LLC	SAD – Kozal Subdivision
A0449	AP16292435	II	Galtar, LLC	SAD – Lathrop Mill
A1005	AP14422540	II	Frehner Construction Company	SAD – Mercury Highway Project
A0772	AP14592262	II	Mud Camp Mining Co., LLC – dba IMV Nevada	SAD – Moretti Mining Area
A0773	AP10412263	II	Sterling Gold Mining Corporation	SAD – Sterling Mine
A0674	AP16292123	II	Clay Management Trust	SAD – T&T Parcels Project
A0770	AP14592260	II	Mud Camp Mining Co., LLC – dba IMV Nevada	SAD – West Dry Lake Mining Area
A0816	AP16292311	II	William Hernstadt	SAD – Zoe Village Estates

Source: Phillip, personal communication 2009

3.1.5 Climate Change

Ongoing scientific research into global climate change correlates increasing atmospheric concentrations of greenhouse gases (including CO_2, methane, nitrous oxide, water vapor, and several trace compounds) with observed trends of increasing temperatures and changes in the amount and seasonal variability precipitation. The assessment of greenhouse gas emissions and climate change is in its formative phase, and the net impact to climate cannot yet be determined with an acceptable degree of certainty. Predicting regional changes in precipitation due to climate change remains challenging, particularly because of uncertainty in regional projections of how precipitation changes (IPCC 2007).

Although uncertainty exists as to whether observed climate changes reflect natural variations or may be caused by increasing emissions of greenhouse gases, there is consensus that global temperatures have been increasing and will continue to increase in the future. As global warming trends continue into the foreseeable future, Chambers (2006) indicates that the following changes may be expected to occur within the Great Basin, which includes the project area.

Due to complex interactions of changes in the hydrologic cycle with global circulation patterns and local weather patterns, an increase in energy in the hydrologic cycle does not necessarily translate into an increase in precipitation in all geographic regions. The IPCC (2001) climate model scenarios indicate that, by 2100, precipitation will increase about 10 percent in summer, about 30 percent in fall, and 40 percent in winter. Less snowfall will accumulate in higher elevations, more precipitation will occur as rain, and snowmelt will occur earlier in the spring because of higher temperatures. The IPCC predicts the following climate changes in the near future.

- Temperature is predicted to rise in most areas, but is generally expected to increase more in inland areas and at higher latitudes. Higher temperatures will increase loss of water through evaporation.

- Streamflow patterns will change in response to reduced snowpacks and increasing precipitation. Peak flows in spring are expected to occur earlier and be of lower magnitude because of snowpack changes. Runoff from greater amounts of winter rainfall will cause higher winter flows. Summer flows will be lower, but with higher variability depending on the severity of storm events.

- Some populations of native plants, invasive species, and pests will expand. Increasing amounts of atmospheric CO_2 and precipitation during the growing season provide favorable growth conditions for native grasses, perennial forbs, woody species, and invasive annuals such as cheatgrass. Insect populations also will likely increase because milder winter temperatures will improve reproduction and survival rates.

- Fire frequency, severity, and extent will increase because of the increased availability of fine fuels (grasses, forbs, and invasives) and accumulation of fuels from previous growing seasons. Higher temperatures will extend the length of fire seasons. Expansion

of piñon-juniper species and increasing tree densities could increase the number of high severity crown fires. Higher rates of insect damage and disease also may increase fuel accumulations.

- Sensitive species and overall biodiversity will be reduced. High-elevation habitats will shrink in area or disappear as lower-elevation plant communities expand. It is probable that some mammalian, avian, and other species that currently inhabit these high-elevation habitats may become extinct. Higher rates of disease and insect damage also may pose threats to other sensitive plant and animal species.

3.2 Geological Hazards and Mineral Resources

This section presents an overview of the regional and local geology, geological hazards, and mineral resources that occur within the Project area and ROI. The main purpose of this analysis is to identify geological hazards that could result in potential risks to Project construction or operation, and any locatable, leasable, and salable mineral deposits that may be impacted by the Project. Geological hazards include active faulting, seismicity, and ground subsidence. The Project area is located in the Amargosa Valley, Nye County, Nevada, within the Leeland, and South of Amargosa Valley, U.S. Geological Survey (USGS) 7.5-minute quadrangle topographic maps.

3.2.1 Regulatory Framework

3.2.1.1 Federal

The NEPA of 1969 and FLPMA serve as the primary federal legislation requiring assessment and mitigation of potential impacts to geological resources on federally administered land; whereas the General Mining Law of 1872, Mineral Leasing Act of 1920, and Mineral Materials Act of 1947 specifically govern the discovery, disposition, and extraction of mineral resources throughout the western United States.

The General Mining Law of 1872 (30 USC §22, 28, 28b) was the first formal, large-scale demarcation of mining claim law in the United States. In general, the law allows United States citizens to locate lode or placer mining claims on federal land that has been opened to mineral entry. Lode claims are located within rock formations or veins of ore, whereas placer deposits are deposits of minerals that have been washed by water into alluvial deposits. The Mineral Leasing Act of 1920 (30 USC §181-187, 187a-b, 188-195, etc.) separated the governance of coal, petroleum, natural gas, and other hydrocarbons away from the jurisdiction of the General Mining Law, and provided regulation and guidance for their leasing on public lands. The Mineral Materials Act of 1947 (30 USC §601-604) regulates the sale and disposal of mineral material resources from public land, including sand, gravel, stone, pumice, pumicite, cinders, clay, other minerals, and petrified wood. Many of the mineral resources governed by this law are most often used for construction or industrial purposes.

The majority of the Project area is located on BLM-administered land. As such, an approved right-of-way is required for the Project and all of the previously listed federal laws regarding geological resources must be adhered to throughout the construction and operation of the proposed Project.

3.2.1.2 State

The establishment of claims on locatable mineral resources, such as lode and placer mines, is governed by the NRS §517.003-517.460. Leasable mineral resources such as oil and gas deposits on state land in Nevada are governed by NRS §522.010-522.190.

3.2.1.3 Local

No local regulations governing geological resources are known to apply to the construction and operation of the proposed Project.

3.2.2 Data Collection Methods

The geological inventory for the proposed Project presents an overview of the regional geology and the specific geological features that occur within the Project area and ROI. The Project area refers to the area that encompasses the proposed right-of-way and associated components. The ROI includes the Project area, as well as the Amargosa Valley Planning Area. Information for the inventory was obtained from the scientific literature (publications and maps) and discussions with agency specialists at the USGS, BLM, and Nevada Bureau of Mines and Geology (NBMG).

Locality information pertaining to geological formations, local seismicity, recent earthquakes, and known areas of Quaternary faulting was compiled into a geographic information system (GIS). The geological formations within the Project area were identified from a geological map of the Nevada Test Site region (Slate et al. 1999). Landslide and fault data were compiled from the USGS Atlas (USGS 2009). Earthquake data between 1973 and the present were acquired from the National Earthquake Information Center (NEIC) (USGS 2009). Seismicity data were obtained from the Geological Hazards Team at the USGS Earthquake Hazard Program (Peterson et al. 2008; USGS 2009).

The mineral resource inventory presents an overview of the locatable, leasable, and salable resources present in the Project area and ROI. Locatable resources are typically metallic mineral deposits such as copper and gold. Leasable resources include energy resources such as petroleum, natural gas, and coal. Salable resources include sand and gravel. Information for the inventory was obtained primarily from the Geocommunicator online database that is operated by the BLM and U.S. Forest Service (USFS) (2009). Additional information was obtained from publications and maps of the USGS, BLM, and NBMG. Mineral resource data were compiled into the GIS.

3.2.3 Regional Geological Setting

The Project area is located within the Amargosa Valley in southern Nevada, which is located in the southwestern part of the Basin and Range physiographic province (Fenneman 1931). The Basin and Range physiographic province is characterized by north-south trending mountain ranges that are separated by alluvium-filled, nearly flat to gently sloping valleys. The mountain ranges consist mostly of Paleozoic quartzite, limestone, dolomite, sandstone, siltstone, shale, and chert. Also present in the mountain ranges are Mesozoic limestone, siltstone, conglomerate, granodiorite, and monzonite. The valleys contain Cenozoic, tuffaceous, sedimentary rocks, as well as alluvial, fluvial, playa, lacustrine, and spring deposits (Stewart 1980). The Basin and Range Province formed through regional, crustal extension of the western part of the North American continental plate, with fault blocks sliding downward, forming basins that are separated by ranges (Eaton 1982).

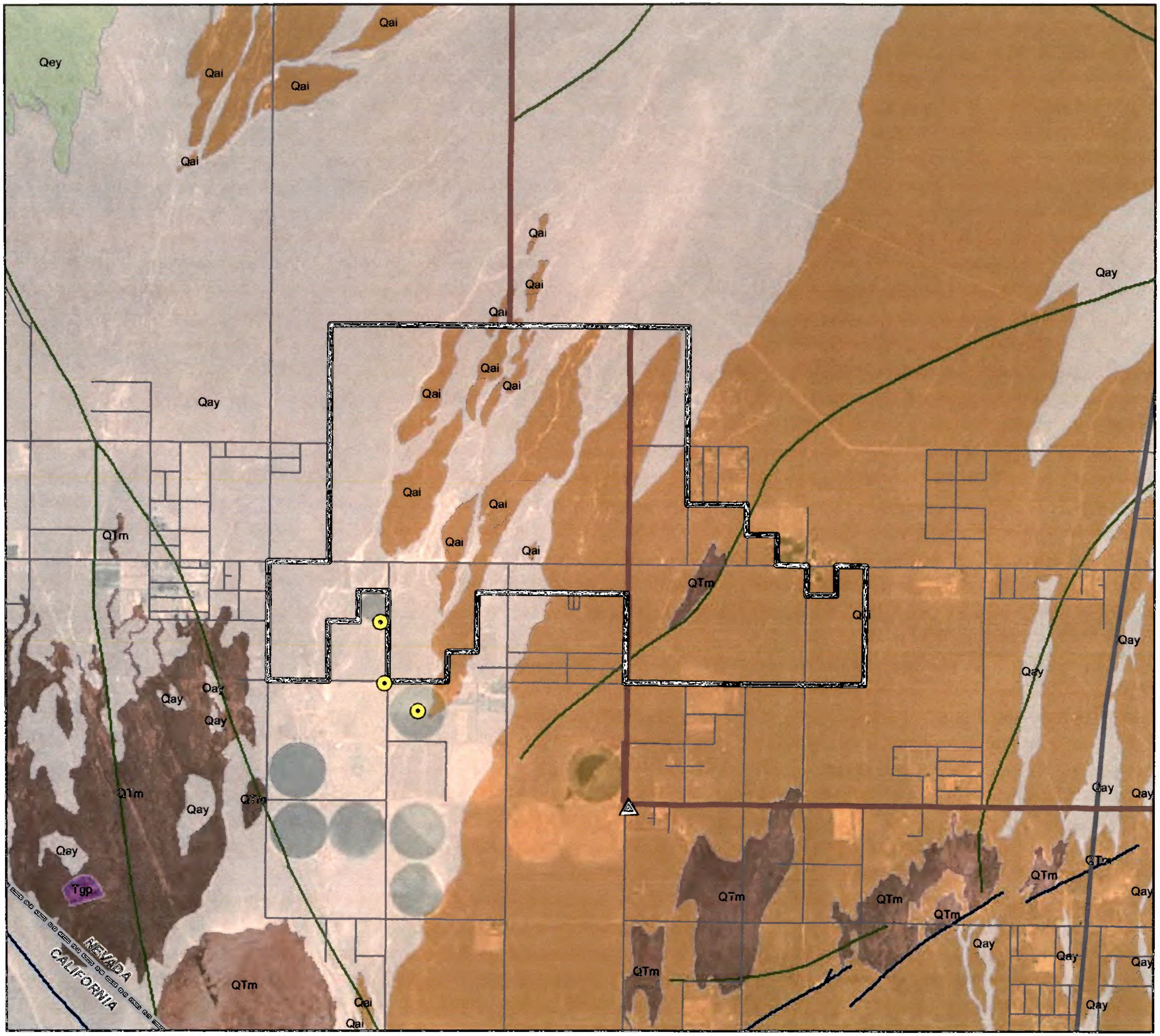
The southeastern portion of Amargosa Valley is bounded by the Amargosa and Funeral Mountain ranges to the southwest; the Ash Meadows area, Specter Range, and Little Skull Mountain to the east; and Yucca Mountain and the Calico Hills to the north. The Amargosa River flows mostly north to south and is underground through the western side of Amargosa Valley. Fortymile Wash is a tributary of the Amargosa River that originates on the Nevada Test Site to the north of the Project area as Fortymile Canyon, before flowing toward the south and becoming Fortymile Wash (Stonestrom et al. 2003). Fortymile Canyon lies between Yucca Mountain and the Calico Hills. Fortymile Wash flows in a southwesterly direction through the Project area before joining the Amargosa River. Fortymile Canyon and Fortymile Wash drain highland areas that are mostly comprised of igneous rocks of Tertiary age. For instance, Yucca Mountain is largely composed of Tiva Canyon Tuff that erupted from the Claim Canyon caldera; whereas, the Calico Hills are composed of the Calico Hills Rhyolite (Slate et al. 1999). Elevation near the Project area is from 2,600 feet above sea level at the floor of Amargosa Valley to over 6,500 feet above sea level at Yucca Mountain.

3.2.4 Geological Units in the Project Area

The Project area contains mostly alluvial-fan deposits, which are the most common geological units within the Amargosa Valley (Figure 3-2). Two Quaternary alluvial deposits and one Quaternary-Tertiary spring deposit are mapped within the Project area (Slate et al. 1999). These mapped geological units are named, respectively: (1) Young alluvial deposits (Qay); (2) intermediate alluvial deposits (Qai); and (3) Quaternary-Tertiary marl deposits (QTm). The alluvial units share a likely source in the mountains and hills to the north of US 95. The Quaternary-Tertiary marl deposits were emplaced by ancient springs and seeps that were present in the Amargosa Valley.

Amargosa Farm Road
Solar Energy Project
(NVN-84359)

Geologic Resources
Figure 3-2



LEGEND

Project Area

Geology

- Intermediate Alluvial Deposit (Qai)
- Marl Deposit (QTm)
- Young Alluvial Deposit (Qay)
- Young Eolian Sand Deposit (Qey)
- Pre-Basin-Range Sedimentary Rock (Tgp)
- Geologic Structure
- Fault

General Reference Features

- Existing Transmission Line (<230kV)
- Existing Substation
- Proposed Project Well
- Highway
- Local Road
- State Boundary

Source: Geology - USGS, 1999;
Transmission Lines, Substations - Platts, 2009;
Wells - Nevada State Engineer, 2008;
Roads - TerraSpectra Geomatics 2009;
Imagery - ESRI, 2009

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0 0.75 1.5 Miles

The hydrogeologic units described by Sweetkind et al. (2004) can be correlated with these geological units. Younger and Older Alluvial Aquifers described by Sweetkind et al. (2004) are correlated with the Young alluvial deposits and intermediate alluvial deposits, respectively; and the Limestone Aquifer is correlated with the marl deposits. The hydrogeologic units described by Winograd and Thordarson (1975) are not correlated with these geological units. The Valley-fill aquifer that they described is present, on average, between 650 and 960 feet deep. The Lower Carbonate aquifer as described by Winograd and Thordarson (1975) is present, on average, between 1,370 and 1,800 feet deep. Devils Hole in the Ash Meadows area is a water-filled cave system in the Paleozoic carbonates of the Bonanza King Formation. This suggests that the surface water in the Ash Meadows area is linked to the Lower Carbonate Aquifer as described by Winograd and Thordarson (1975).

3.2.4.1 Young Alluvial Deposits

Quaternary to recent alluvium is mapped as a long, southwestern-oriented lobe overlying another broader and older alluvial fan composed of older Quaternary alluvial material (see Figure 3-2). Young alluvial deposits comprises poorly sorted silt, sand, gravel, and cobbles, with a typical total thickness of less than 2 meters (Slate et al. 1999). These deposits are Holocene to Recent in age (10,000 years old to present) and exhibit little to no development of desert pavement. Surface clasts are unvarnished. Young alluvial deposits are present in the western half of the Project area.

3.2.4.2 Intermediate Alluvial Deposits

Intermediate alluvial deposits are mapped alongside the Young alluvial deposits as the principal component of a large alluvial fan that covers most of the eastern end of Amargosa Valley (Slate et al. 1999). Intermediate alluvial deposits consist of silt, sand, gravel, and cobbles. Surface clasts are old enough (Holocene to late Pleistocene in age) to have acquired some desert varnish.

3.2.4.3 Quaternary-Tertiary Marl Deposits

Marl deposits of Quaternary-Tertiary age are the only non-alluvial geological units mapped within the Project area (see Figure 3-2). These spring deposits consist of massive to well-bedded mudstone and marlstone that commonly contain fossil root casts of plants (Slate et al. 1999).

3.2.5 Unique Geological Resources

Unique geological resources that may have recreational interest to the general public include dunes, natural bridges, caves, waterfalls, and rock or mineral collecting areas. Based on a search of recreation-related websites (e.g., Nevada Division of State Parks), there are no known recreational or unique geological resources associated with the Project area.

The nearest geological resource of recreational interest is the Big Dune complex located in Amargosa Valley, approximately 4 miles northwest of the Project area. The Big Dune complex is

protected as a BLM-designated ACEC. The dune is composed of Quaternary eolian dune sand derived from Precambrian source rocks, likely the Funeral Mountains southwest of the dune field (Castor et al. 2006; Slate et al. 1999). The Big Dune exhibits the characteristic multi-lobed morphology of a large, pyramidal star dune. Star dunes are frequently stable, only shifting within a localized area, often remaining fixed in place for centuries (Bates and Jackson 1987). There is no evidence that the Big Dune is currently moving or has moved in the past 100 years.

3.2.6 Geological Hazards

Geological hazards include earthquakes, faults, seismicity, and ground subsidence. Earthquake data have been compiled by the USGS NEIC since 1973 (USGS 2009). The USGS maintains archives of all earthquakes of detectable magnitude and have made this earthquake catalog available to the public. No earthquakes have been recorded within the Project area, although nine earthquakes have been recorded within 10 miles of the Project area, ranging from 2.9 to 4.1 magnitudes on the Richter scale (Figure 3-3). The most recent earthquake occurred in 2004, in the Funeral Mountains southwest of the Project area.

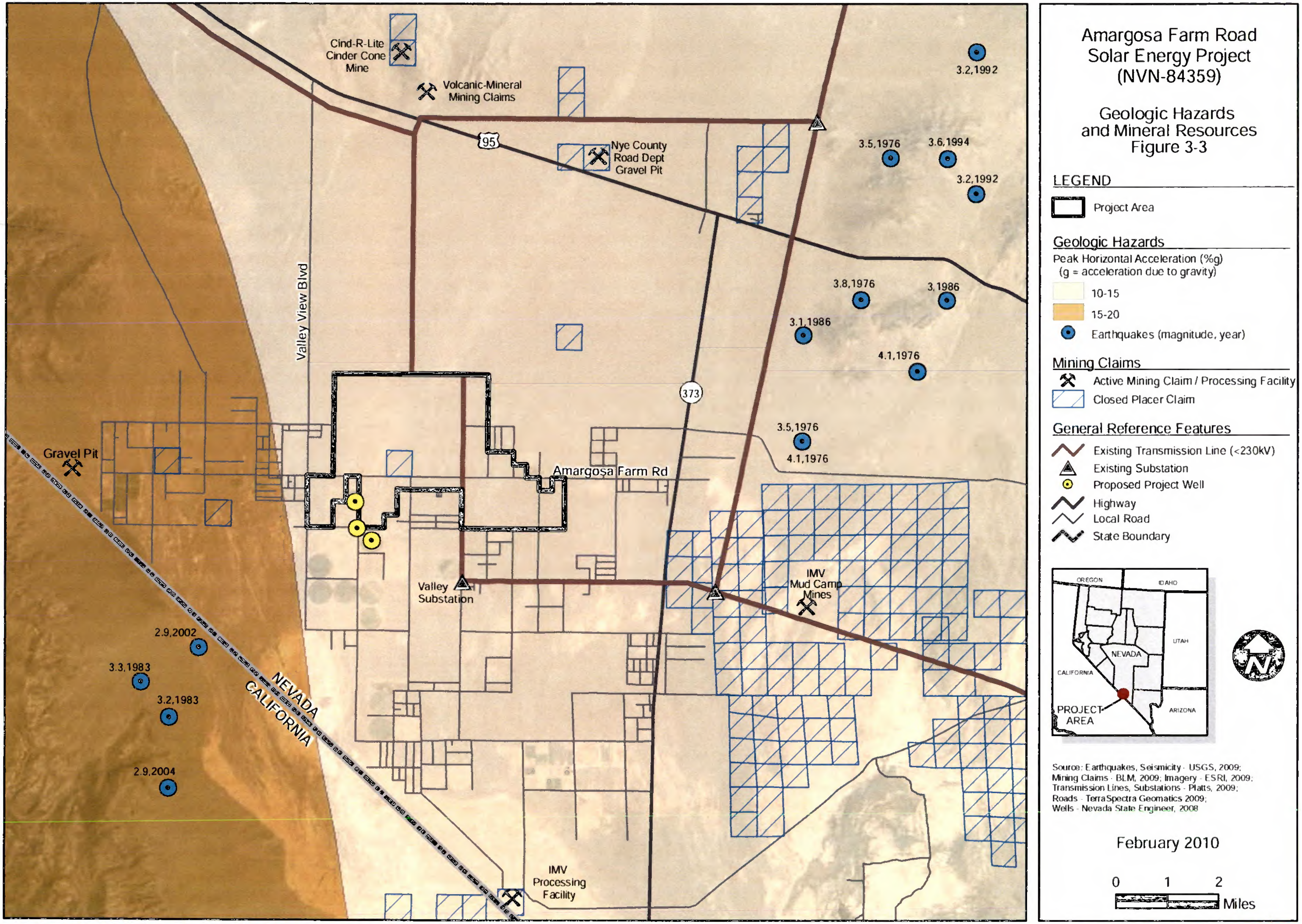
Faults have been mapped in the eastern portion of the Project area, as well as outside the Project area to the west (Figure 3-3). These faults were inferred from gravity anomalies in the Amargosa Valley. Quaternary to Recent faults have also been mapped southeast of the Project area, and are the likely source of spring deposits and Quaternary marls, as the faults provide a path for groundwater to reach the surface (dePolo 2008; Slate et al. 1999).

Seismicity is a measure of the susceptibility of an area to damaging earthquakes and is measured in terms of acceleration due to gravity (Peterson et al. 2008). Seismicity data and maps are available from the Geological Hazards Team, a unit of the USGS Earthquake Hazard Program (USGS 2009). The region around the Project area is mapped as having 10 to 15 pereent gravity (Figure 3-3). According to the USGS, 10 percent gravity is the lower threshold at which damage to structures is likely to occur, dependent upon measures taken in design and construction to mitigate structural damage as a result of ground shaking.

Ground subsidence is the relative downward motion of the local land surface that is often the result of subsurface mining, drawdown of groundwater for irrigation, or settling of soils resulting from local usage of high explosives for mining or construction. Within the Project area, groundwater drawdown is the most likely cause for ground subsidence. Minor amounts of subsidence has been mapped using satellite interferometry within Amargosa Valley, which is attributed to both groundwater usage and the complex spring activity that is characteristic of Amargosa Valley (Katzenstein and Bell 2005).

3.2.7 Mineral Resources

An inventory of mineral resources was conducted in and around the Project area to determine if known mineral resources are present, or if there is a possibility of discovering mineral resources in the future. The inventory included locatable, leasable, and salable mineral resources and was conducted using information from the USGS, BLM, and NBMG.



Amargosa Farm Road
Solar Energy Project
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Geologic Hazards
and Mineral Resources
Figure 3-3
LEGEND
Project Area
Geologic Hazards
Peak Horizontal Acceleration (%g)
(g = acceleration due to gravity)
10-15
15-20
Earthquakes (magnitude, year)
Mining Claims
Active Mining Claim / Processing Facility
Closed Placer Claim
General Reference Features
Existing Transmission Line (<230kV)
Existing Substation
Proposed Project Well
Highway
Local Road
State Boundary
OREGON
IDAHO
UTAH
NEVADA
CALIFORNIA
ARIZONA
PROJECT AREA
Source: Earthquakes, Seismicity - USGS, 2009; Mining Claims - BLM, 2009; Imagery - ESRI, 2009; Transmission Lines, Substations - Platts, 2009; Roads - TerraSpectra Geomatics 2009; Wells - Nevada State Engineer, 2008
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0
1
2
Miles
Cind-R-Lite
Cinder Cone
Mine
Volcanic-Mineral
Mining Claims
95
Nye County
Road Dept
Gravel Pit
3.2,1992
3.5,1976
3.6,1994
3.2,1992
Valley View Blvd
3.8,1976
3,1986
3.1,1986
4.1,1976
373
3.5,1976
4.1,1976
Gravel Pit
Amargosa Farm Rd
Valley
Substation
IMV
Mud Camp
Mines
2.9,2002
3.3,1983
3.2,1983
NEVADA
CALIFORNIA
2.9,2004
IMV
Processing
Facility

Active mining claims and mineral-materials areas are mapped by the Geocommunicator online mapping system maintained by the BLM and USFS. There are four aetive mineral-resource-extraction areas in Amargosa Valley within 5 miles of the Project area (see Figure 3-3). The first area has active mining claims staked by Mud Camp Mining, LLC, which are present to the southeast of the Project area in sections 20, 21, and 29 of T16S R50E. The Mud Camp Mining claims provide specialty clays (sepiolite and saponite) to a processing facility operated by IMV Nevada, located in section 29 of T17S R49E to the south of the Project area. The second area, in section 10 of T15S R49E, is a sand and gravel site used by Nye County under a Free Use Permit. The third area contains an active sand and gravel operation at the western end of Amargosa Farm Road, approximately 5 miles from the Project area. The fourth area has a series of public and private claims for volcanic-mineral materials, such as pumice and cinder, which are located north of the Project area at the junction points of T14S R48E, T14S R49E, T15S R48E, and T15S R49E.

This final group of claims includes the Cinder Cone Mine operated by the Cind-R-Lite Block Company, located in section 36 of T14S R48E. None of these four active mineral-resource-extraction areas is located in the Project area. Potential mineral resources located within the Project area are described below.

3.2.7.1 Locatable Mineral Resources

There are no active claims in the Project area (BLM and USFS 2009).

3.2.7.2 Leasable Mineral Resources

No leases for leasable mineral resources (oil, gas, and coal resources) are recorded within the Project area (Garside and Hess 2007; Hess et al. 2004; BLM and USFS 2009).

3.2.7.3 Salable Mineral Resources

No mineral-material contracts for salable mineral resources (sand, gravel, topsoil, and clay) are recorded within the Project area (BLM and USFS 2009).

3.3 Soils

3.3.1 Data Collection Methods

The soil inventory presents an overview of soil types and characteristics, including areas of potential wind and/or water erosion in the Project area. Information for the inventory was obtained primarily from publications, unpublished reports, data of the Soil Conservation Service and the BLM, and from discussions with specialists. The soils inventory was compiled from data maintained online as part of the U.S. Department of Agriculture (USDA) Natural Resources

Conservation Service (NRCS) Web Soil Survey, namely the USDA soil survey report that includes the Project area and ROI.

3.3.2 Soils in the Project Area

Four soil map units (three associations and one series) have been mapped within the Project area (Figure 3-4): (1) the Yermo, hot-Yermo-Arizo association; (2) Lewdlac-Yermo association; (3) Sanwell-Sanwell, warm-Yermo association; and (4) Shamock series (Borup 2004).

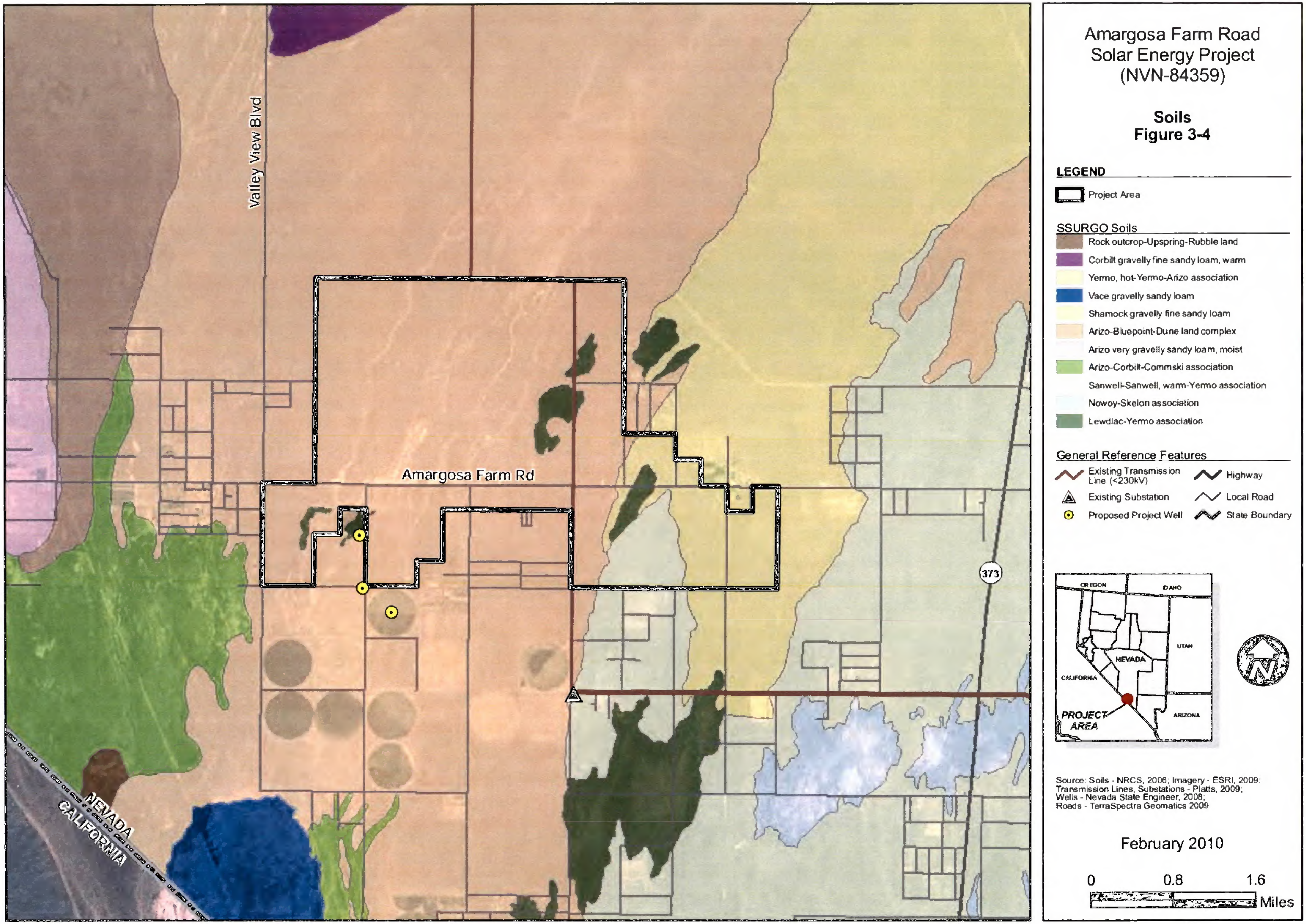
A soil association is a map unit used in soil surveys to represent areas that contain two or more distinct soil series in such a pattern that it is easy to illustrate them as a single map unit for mapping purposes. A soils series is an individual map unit, much like a geological formation that represents an area that has unique characteristics. The four soil map units mapped within the Project area are listed in Table 3-6.

3.3.2.1 Yermo, hot-Yermo-Arizo Association

The Yermo, hot-Yermo-Arizo association mostly comprises 40 percent hot-Yermo soil, 30 percent Yermo soil, and 15 percent Arizo soil on slopes of 2 to 4 percent. This soil association is the most common, covering more than two-thirds of the Project area. The Yermo, hot-Yermo-Arizo association has a low water capacity, with moderately rapid to very rapid permeability, and is assigned to hydrologic group B, which corresponds to a moderate water-infiltration route in soils with fine to moderately coarse texture. The soil association has a measured pH of 8.5. Bedrock is not encountered at 80 inches of depth and is likely much deeper. This map unit has been rated as a poor candidate to provide suitable topsoil for reclamation efforts (Borup 2004).

The soils of the Yermo series are typically deep and well drained, occurring on alluvial fans with alluvium derived from mixed rocks. Typically, Yermo series soils are characterized as loamy-skeletal, mixed, superactive, calcareous, thermic, Typic Torriorthents (Borup 2004). The taxonomic classification, Typic Torriorthents, is given to those soil units that exemplify the torriorthents, a soil order that is defined by little to no development of any true soil horizons and that are formed in warm, arid environments (USDA-NRCS 1993). This soil order and its variations are some of the most common soils throughout the Southwest (Birkeland 1999). Within this soil association, the Yermo series is divided into two separate soil units, the Yermo and the hot-Yermo. This division reflects varying average temperatures recorded within the Yermo series, possibly due to greater gravel content or slope facing.

The soils of the Arizo series are typically deep and excessively drained, occurring on inset fans with slopes between 0 and 15 percent. Arizo series soils form in alluvium that is derived from mixed rocks (e.g., igneous, carbonate). Taxonomically, Arizo series soils are characterized as sandy-skeletal, mixed, thermic, Typic Torriorthents (Borup 2004).


Amargosa Farm Road
Solar Energy Project
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Soils
Figure 3-4
LEGEND
Project Area
SSURGO Soils
Rock outcrop-Upspring-Rubble land
Corbilt gravelly fine sandy loam, warm
Yermo, hot-Yermo-Arizo association
Vace gravelly sandy loam
Shamock gravelly fine sandy loam
Arizo-Bluepoint-Dune land complex
Arizo very gravelly sandy loam, moist
Arizo-Corbilt-Commski association
Sanwell-Sanwell, warm-Yermo association
Nowoy-Skelon association
Lewdlac-Yermo association
General Reference Features
Existing Transmission Line (<230kV)
Highway
Existing Substation
Local Road
Proposed Project Well
State Boundary
OREGON
IDAHO
NEVADA
UTAH
CALIFORNIA
ARIZONA
PROJECT AREA
N
Source: Soils - NRCS, 2006; Imagery - ESRI, 2009; Transmission Lines, Substations - Platts, 2009; Wells - Nevada State Engineer, 2008; Roads - TerraSpectra Geomatics 2009
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0
0.8
1.6
Miles
Valley View Blvd
Amargosa Farm Rd
373
NEVADA
CALIFORNIA

Table 3-6 Soil Map Units and Properties within Project Area

Map Unit		Yermo, hot-Yermo-Arizo association	Shamoek series	Sanwell-Sanwell, warm-Yermo association	Lewdlac-Yermo association
Texture		Skeletal, mixed, thermic, Typic Torriorthents	Coarse-loamy, mixed, thermic, Typic Haplodurids	Skeletal, mixed, thermic Duric Torriorthents	Loamy, mixed, thermic, Cambidic Haplodurids
Permeability		Moderately rapid to very rapid	Moderate	Moderate to moderately rapid	Moderately rapid
pH		8.5	8.5	8.2	8.2
Water Capacity		Low	Low	Low	Very low
Hydrologic Group		B	C	B	D
Water Erosion	**Kw**	0.1	0.2	0.2	0.2
	Kf	0.2	0.3	0.4	0.3
	T	5	2	5	2
Wind Erosion	**WEG**	5	4	4	3
	WEI	56	86	86	86
Landscape Position (percentage slope)		2 to 4	2 to 4	0 to 4	2 to 4
Depth to Bedrock/ Restrictive Feature (inches)		>80	25 to 40 to duripan	>80	10 to 20 to duripan
Land Capability (Irrigated, Nonirrigated)		4	4	–	7
Topsoil Reclamation		Poor	Poor	Poor	Fair

Key:
Kw = susceptibility of the whole soil to sheet and rill water erosion
Kf = susceptibility of only the soil's fine portion (<2 millimeters in diameter) to these same forms of water erosion.
(Generally, soils that are more susceptible to water erosion will exhibit greater Kw and Kf factors.)
WEG = wind erodibility group, soils assigned lower ratings are more susceptible to erosion.
WEI = wind erodibility index

3.3.2.2 Lewdlac-Yermo Association

The Lewdlac-Yermo association is intermittently present in the Project area, specifically in the southwestern, southeastern, and northeastern corners of the Project area. The Lewdlac-Yermo association consists of 70 percent Lewdlac series soils and 15 percent Yermo series soils on slopes of 2 to 4 percent. The Lewdlac-Yermo association exhibits very low water capacity with moderately rapid permeability and is assigned to hydrologic group D, which corresponds to a very slow water-infiltration rate. This is likely because of a duripan layer between 10 and 20 inches below the surface that impedes the transmission of water. This soil association has a measured pH of 8.2. Bedrock is not encountered at 80 inches and is likely much deeper. The Lewdlac-Yermo association has been given a fair rating regarding its suitability to provide topsoil for reclamation efforts (Borup 2004).

The soils of the Lewdlac series are typically shallow, over a strongly cemented duripan. These well-drained soils occur on alluvial flats with slopes ranging from 2 to 8 percent. Lewdlac series soils form in alluvium mostly derived from quartzite over reworked lacustrine sediments. Typically, Lewdlac series soils are characterized as loamy, mixed, superactive, thermic, shallow, Cambidic Haplodurids. The soil taxonomic classification, Cambidic Haplodurids, includes aridisols that contain a duripan within the upper 100 centimeters of the soil unit that is strongly cemented (Borup 2004).

Yermo series soils mapped within this soil association exhibit the same characteristics as those mapped as part of the Yermo, hot-Yermo-Arizo association.

3.3.2.3 Sanwell-Sanwell, warm-Yermo Association

The Sanwell-Sanwell, warm-Yermo association is restricted to the southeastern portion of the Project area. It consists of 65 percent Sanwell series soils and 20 percent Yermo series soils on slopes of 0 to 4 percent. This soil association exhibits low water capacity with moderately rapid permeability and is assigned to hydrologic group B, which corresponds to a moderate water-infiltration route in soils with fine to moderately coarse texture. The Sanwell-Sanwell, warm-Yermo association has a measured pH of 8.2. This soil association has been assigned a poor rating regarding its suitability for use as topsoil for reclamation efforts (Borup 2004).

The soils of the Sanwell series are typically very deep and well drained, occurring on alluvial flats with slopes ranging from 0 to 8 percent. Sanwell series soils form in coarse lacustrine sediments. This lacustrine source is likely associated with the marl deposits that are mapped just upslope from the location of this soil unit. Typically, Sanwell series soils are characterized as loamy-skeletal, mixed, superactive, calcareous, thermic, Duric Torriorthents. The taxonomic soil classification, Duric Torriorthents, applies to soil units formed in hot and arid environments that do not exhibit well-developed soil horizons, but may include a notably harder and competent soil horizon within 100 centimeters of the soil surface (Borup 2004).

Yermo series soils mapped within this soil association exhibit the same characteristics as Yermo soils mapped as part of the Yermo, hot-Yermo-Arizo association.

3.3.2.4 Shamock Series

The Shamock series is restricted to the easternmost portion of the Project area and has the second greatest areal extent within the Project area. It is present within the Project area on slopes of 2 to 4 percent. This soil series exhibits a low water capacity with moderate permeability. It is assigned to hydrologic group C, which corresponds to a slow rate of water infiltration in soils with moderately fine to moderately coarse texture. The Shamock series has a pH level of 8.5. A well-indurated duripan is present between 25 and 40 inches from the surfaee of the soil unit. This soil unit has been given a poor rating for suitability for topsoil reclamation, because of difficulty of recovery (Borup 2004).

The soils of the Shamock series are typically moderately deep over a duripan. The well-drained soils occur on alluvial flats with slopes ranging from 0 to 4 percent. Shamock series soils form in alluvium derived from mixed rocks. Typically, Shamock series soils are characterized as coarse-loamy, mixed, superactive, thermic, Typic Haplodurids. The taxonomic classification Typic Haplodurids refers to aridisols, soils formed in arid environments with well-developed soil horizons that contain a duripan within the upper 100 centimeters of the soil unit (Borup 2004).

3.3.3 Erosion Potential

Water erosion of soils are typically indicated in soil surveys by two factors, Kw and Kf, where Kw represents the general susceptibility of the whole soil to sheet and rill water erosion, and Kf represents the susceptibility of only the soil's fine portion (<2 millimeters diameter) to these same forms of water erosion (USDA-NRCS 1993). Generally, soils that are more susceptible to water erosion will exhibit greater Kw and Kf factors. The Yermo, hot-Yermo-Arizo association, located in the western two-thirds of the Project area, is the least susceptible to water erosion (lower Kw and Kf factors), whereas the other soil associations that are located in the eastern one-third of the Project area are more susceptible to water erosion (higher Kw and Kf factors).

Wind erosion may have adverse impacts on soils, particularly those that lack vegetation cover (USDA-NRCS 1993). The NRCS assesses a soil series' susceptibility to wind erosion by assigning each soil series to a wind erodibility group (WEG). This includes a rating on the wind erodibility index (WEI) that is measured in tons of soil lost per acre per year. These determinations are made based upon the composition and texture of a given soil. For example, soils with well-established desert pavement are far less susceptible to wind erosion than unvegetated soils that are composed of fine sand soils assigned lower ratings of the WEG scale are more susceptible to erosion than soils assigned higher ratings. WEG ratings of 3 or 4 are assigned to the Lewdlac-Yermo association; Sanwell-Sanwell, warm-Yermo association; and Shamock series. The Yermo, hot-Yermo-Arizo association is less susceptible to wind erosion and is assigned to a WEG of 5 (Borup 2004). Therefore, soils in the western two-thirds of the Project area are less susceptible to wind erosion than soils in the eastern one-third of the Project area.

3.3.4 Prime and Unique Farmland

The USDA uses the designation *prime farmland* to describe soils that have the correct combination of physical and chemical characteristics that allow the soil to produce significant amounts of food, feed, fiber, or oilseed crops. These characteristics include soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when properly managed with farming methods such as an adequate and dependable water supply (USDA-NRCS 1993). No soil within the Project area has been designated as prime farmland; and therefore will not be assessed according to the Farmland Protection Policy Act. However, irrigated farmlands are present south of the Project area. These agricultural areas are serviced by rotary irrigation systems that create the circular patterns easily visible in aerial photographs. Without the irrigation systems, it is unlikely that Amargosa Valley could support extensive agriculture.

3.4 Water Resources

This section presents an overview of the surface and groundwater resources in the ROI which could be affected by construction, operation, and maintenance of the proposed Project. The ROI for surface water is different from the groundwater ROI based on potential effects of the proposed Project on water resources. Surface water features in the ROI are described in Section 3.4.5, followed by a discussion of groundwater resources in Section 3.4.6. Because springs are a function of groundwater expression and influence, regional springs are discussed in the groundwater resources section.

3.4.1 Regulatory Framework

3.4.1.1 Federal

Federal laws and policies establish standards for clean water, controlling development in flood plains, and protecting the environment. The Clean Water Act (CWA) 33 USC Section 1257 et seq. regulates both direct and indirect discharges, including stormwater discharges from construction and industrial activities.

The CWA also protects navigable waters in Section 401. Section 401 certification, obtained from the NDEP, is required if there are potential impacts to surface waters of the State and/or waters of the United States. Section 401 requires impacts to these waters to be quantified and mitigated.

Quality of Waters of the U.S. is protected through Section 402 of the CWA, which regulates wastewater and stormwater discharges through the National Pollutant Discharge Elimination System (NPDES). Activities resulting in dredging or filling of jurisdictional waters of the U.S., which can include drainages and ephemeral washes, require authorization under a Section 404 Permit issued by the USACE.

3.4.1.2 State

Nevada water law is set forth in NRS Chapters 533 and 534. The NDWR, headed by the State Engineer, is responsible for the implementation and reallocation of public waters. Applications for new appropriations or to change water already appropriated under an existing right must be reviewed and approved by the State Engineer, prior to any water diversion. The Nevada State Engineer determines the limit and extent of water rights and establishes any appropriate conditions regarding these rights. In ruling on a water right application, the State Engineer must consider four criteria:

1. Is there unappropriated water available for the proposed use?
2. Will the proposed water use impair senior water rights?
3. Is the proposed water use in the public interest?
4. Is the proposed project feasible, and if so is it filed for speculative purposes?

When a water rights permittee has "perfected" a water right, shown that the water has been put to beneficial use as defined by NRS 533.030 and NRS 533.035, the Nevada State Engineer's Office issues a Certificate of Appropriation. Once granted, water rights in Nevada have the standing of both real and personal property; meaning they are conveyed as an appurtenance to real property unless they are specifically excluded in the deed of conveyance. When water rights are purchased or sold as personal property or treated as a separate appurtenance in a real-estate transaction, the water rights are conveyed specifically by a deed of conveyance. It is possible to buy, sell, or lease water rights and change the water's point of diversion, manner of use, and place of use by filing an application with the State Engineer (NDWR 2009a).

The State of Nevada Stormwater Program, administered by NDEP, requires operators of large and small construction sites to obtain an NPDES construction stormwater permit in order to discharge stormwater. The submittal of a Notice of Intent for inclusion under the State of Nevada's General Stormwater Permit and a Stormwater Pollution Prevention Plan (SWPPP) is required for all soil disturbing activities (including grading, trenching, and demolition), where one or more acres will be disturbed, and have a discharge of stormwater to a receiving water (e.g., wetlands, creeks, unnamed creeks, rivers, marine waters, ditches, and estuaries), and/or storm drains that discharge to a receiving water.

3.4.1.3 Local

The Nye County Water Resources Plan (2002) outlines the county plan for ensuring adequate supplies of water remain available in Nye County to maintain and enhance the quality of the environment; to improve the quality of life for residents and visitors to the County; and to expand and diversify the economy of the County.

3.4.2 Hydrologic Setting

The proposed Project is located in the Amargosa Desert in south-central Nevada in the southern portion of Nye County. The Amargosa Desert, a northwest-southeast trending valley, is separated from Death Valley to the southwest by the Funeral Mountains and bounded on the north and east by a series of mountain ranges. For water planning and management purposes, the USGS and the NDWR, Department of Conservation and Natural Resources, have divided the state into 256 discrete hydrologic basins and sub-areas, within 14 major hydrologic units called Hydrographic Regions (NDWR 2009b). Hydrographic basins and sub-areas generally consist of valleys that are separated by surface-water drainage divides (Rush 1968).

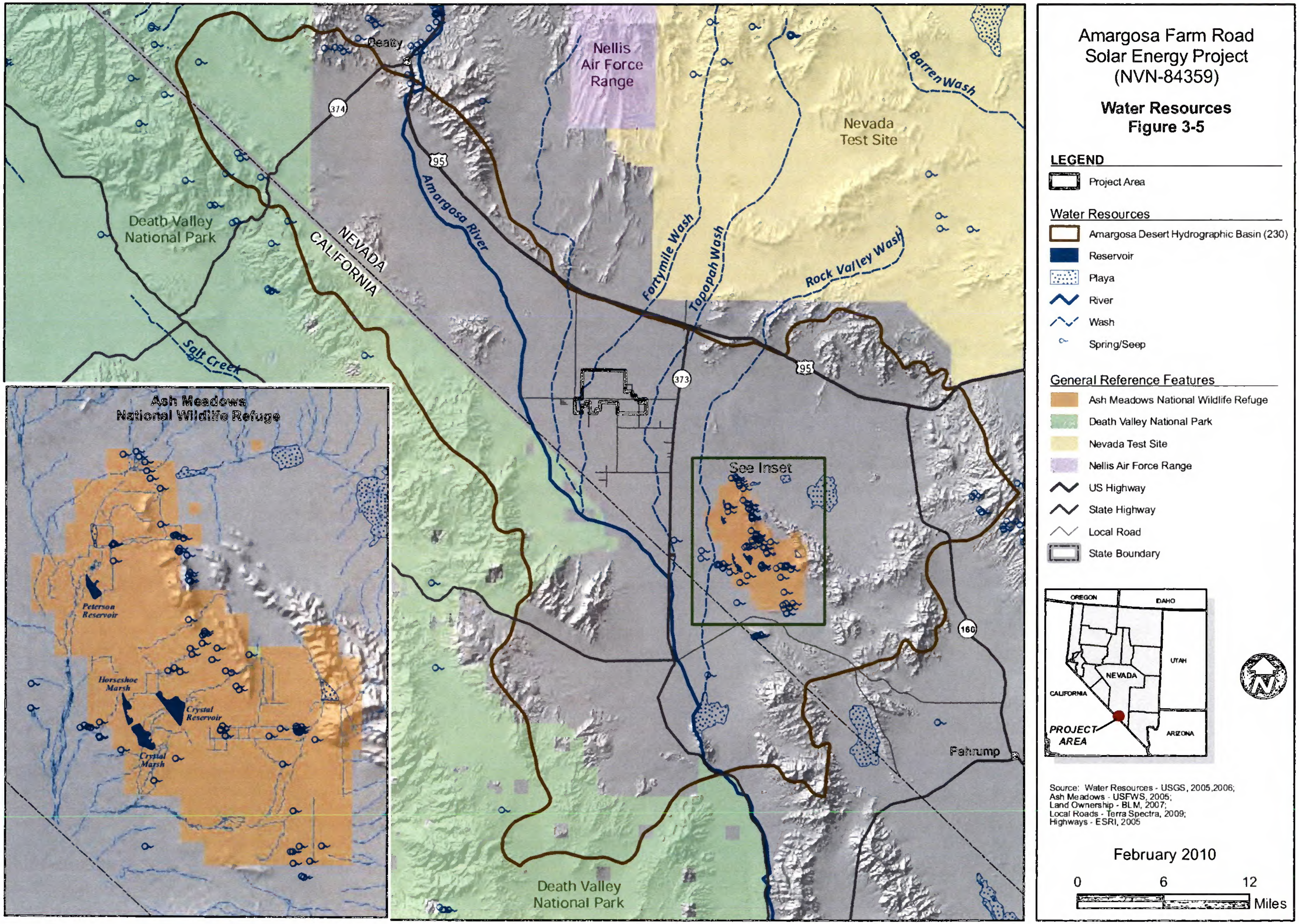
All project components would be located within the Nevada portion of the Amargosa Desert Hydrographic Basin (#230), which is a part of the Death Valley Hydrographic Region (#14). The Amargosa Desert Hydrographic Basin covers 896 square miles (573,440 acres). Approximately 65 percent of the Amargosa Desert Hydrographic Basin is located in Nye County, with the remainder in Inyo County, California, primarily within Death Valley National Park (Figure 3-5).

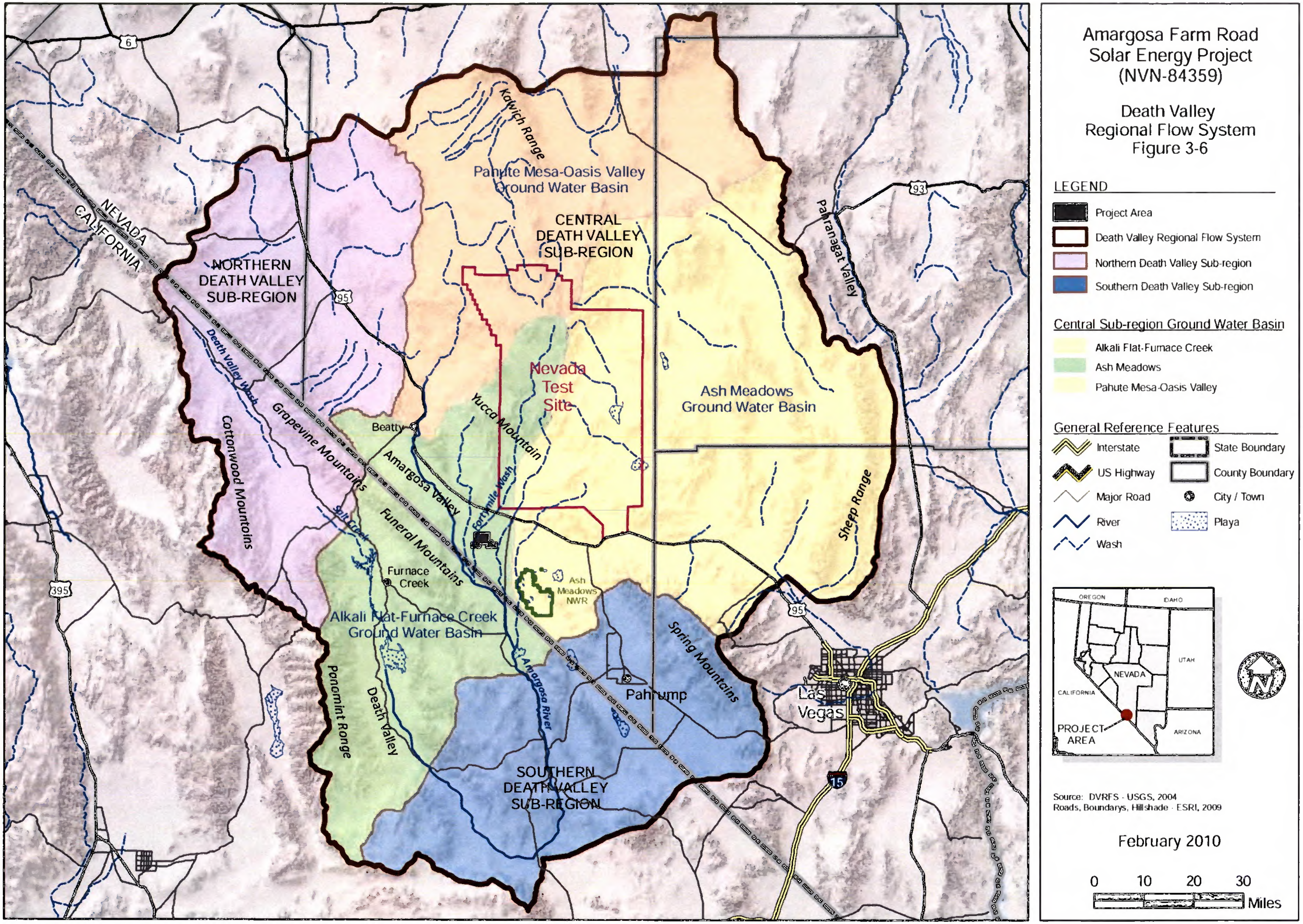
The Death Valley Hydrographic Region covers an area of 2,593 square miles (1,659,520 acres), including portions of Nye and Esmeralda County in Nevada, extending south and west into California. The Nevada State Engineer has jurisdiction over water use in Nevada.

As shown on Figure 3-6, groundwater basins in the regional area are further subdivided into a small number of hydrogeologic sub-basins. The Death Valley regional groundwater flow system includes the Northern Death Valley, the Central Death Valley, and the Southern Death Valley sub-basins. The proposed Project is located in the Central Death Valley sub-basin. There are three groundwater basins in the Central Death Valley sub-basin: (1) Pahute Mesa-Oasis Valley groundwater basin; (2) Ash Meadows groundwater basin; and (3) Alkali Flat-Furnace Creek groundwater basin. The Project site is located in the Alkali-Flat-Furnace Creek groundwater basin.

3.4.3 Data Collection Methods

Since the early 1950s, extensive investigations have been conducted to characterize water resources that have been, or may be, affected by activities at the Nevada Test Site and the proposed Yucca Mountain repository. In addition, because of the presence of environmentally sensitive areas at Devils Hole, Ash Meadows, and Death Valley, extensive hydrological monitoring infrastructure has been installed and has resulted in the accumulation of over 40 years of water level monitoring and water chemistry analysis in the Death Valley Hydrographic Basin.


Amargosa Farm Road
Solar Energy Project
(NVN-84359)
Water Resources
Figure 3-5
LEGEND
Project Area
Water Resources
Amargosa Desert Hydrographic Basin (230)
Reservoir
Playa
River
Wash
Spring/Seep
General Reference Features
Ash Meadows National Wildlife Refuge
Death Valley National Park
Nevada Test Site
Nellis Air Force Range
US Highway
State Highway
Local Road
State Boundary
OREGON
IDAHO
UTAH
NEVADA
CALIFORNIA
ARIZONA
PROJECT AREA
Source: Water Resources - USGS, 2005,2006;
Ash Meadows - USFWS, 2005;
Land Ownership - BLM, 2007;
Local Roads - Terra Spectra, 2009;
Highways - ESRI, 2005
February 2010
0
6
12
Miles
Beatty
Nellis
Air Force
Range
Nevada
Test Site
Barren Wash
Death Valley
National Park
NEVADA
CALIFORNIA
Amargosa River
Fortymile Wash
Topopah Wash
Rock Valley Wash
Salt Creek
374
95
373
160
See Inset
Fahrump
Death Valley
National Park
Ash Meadows
National Wildlife Refuge
Peterson Reservoir
Horseshoe Marsh
Crystal Reservoir
Crystal Marsh



Amargosa Farm Road
Solar Energy Project
(NVN-84359)
Death Valley
Regional Flow System
Figure 3-6
LEGEND
Project Area
Death Valley Regional Flow System
Northern Death Valley Sub-region
Southern Death Valley Sub-region
Central Sub-region Ground Water Basin
Alkali Flat-Furnace Creek
Ash Meadows
Pahute Mesa-Oasis Valley
General Reference Features
Interstate
US Highway
Major Road
River
Wash
State Boundary
County Boundary
City / Town
Playa
Source: DVRFS - USGS, 2004
Roads, Boundarys, Hillshade - ESRI, 2009
February 2010
0 10 20 30
Miles
NORTHERN DEATH VALLEY SUB-REGION
CENTRAL DEATH VALLEY SUB-REGION
SOUTHERN DEATH VALLEY SUB-REGION
Pahute Mesa-Oasis Valley Ground Water Basin
Ash Meadows Ground Water Basin
Alkali Flat-Furnace Creek Ground Water Basin
Nevada Test Site
NEVADA
CALIFORNIA
Kawich Range
Pahranagat Valley
Sheep Range
Spring Mountains
Yucca Mountain
Fortymile Wash
Amargosa Valley
Amargosa River
Funeral Mountains
Grapevine Mountains
Cottonwood Mountains
Death Valley Wash
Salt Creek
Panamint Range
Death Valley
Beatty
Furnace Creek
Ash Meadows NWR
Pahrump
Las Vegas
OREGON
IDAHO
UTAH
NEVADA
CALIFORNIA
ARIZONA
PROJECT AREA

The DOE, in cooperation with the USGS and other federal, state, and local agencies, has conducted studies to evaluate water-resources potential of the region, evaluate the impacts of groundwater pumping, estimate groundwater recharge from wash infiltration, and evaluate regional groundwater flow. Between 1951 and 1996, more than 1,700 publications and abstracts have been written about the geology, hydrogeology, and hydrology of the Nevada Test Site area (Seaber et al. 1997). Since 1996, additional studies have been conducted as new technology has emerged, and the body of knowledge has increased. Hydrologic investigations relevant to the Amargosa Desert include measurements of evapotranspiration within the Central sub-region; construction of a dataset for pumping in the Amargosa Desert (and other areas); and measurement of groundwater recharge underneath the Amargosa River and irrigated fields in the Amargosa Farms area.

The references that were selected for use in this analysis are listed in Chapter 6 – References, with full bibliographic citations. The information compiled from these sources is assumed to be factual and sufficiently accurate for use in this analysis.

Additional data sources reviewed for this EIS include USGS topographic and aerial maps, reports and studies prepared by the DOE for the proposed Yucca Mountain Geologic Repository, as well as additional water resource reports by various organizations. Basin water rights abstracts and pumpage inventories were obtained from NDWR and were used as the basis for the values of perennial yield, committed water resources, and estimated water use in the ROI.

3.4.4 Regional Climate

The present climate in the Amargosa Desert region is arid to semiarid, with average annual precipitation ranging from less than 4 inches at lower elevations to more than 11 inches at higher elevations (CEMP 2009). Precipitation in Nevada is highly variable temporally and spatially. Winter storms and summer monsoons are the two seasonal weather patterns that bring precipitation to Nevada (Houghton et al. 1975). During some winters, relatively warm storms originate from the central and tropical Pacific Ocean. These storms can generate large amounts of moisture and cause regional flooding. During the summer, prevailing southwesterly winds bring monsoonal moisture from the Gulfs of Mexico and California. In the Project area, precipitation averages 4.2 inches annually with annual extremes from less than 1 inch to more than 10 inches (CEMP 2009). Historic climate data is provided in Section 3.1 – Air Quality. A discussion of flood occurrence in the regional area is provided in the following section.

3.4.5 Surface Water Hydrology

3.4.5.1 Surface Water Features

The ROI for surface water resources is the Amargosa River drainage system. The Amargosa River is dry most of its 90-mile length, except for areas near Beatty, Nevada, approximately 25 miles north of the proposed Project; and Tecopa, California, approximately 50 miles south of the Project site. Short reaches of the river in these areas flow seasonally where discharging springs maintain small, perennial base flows.

The Amargosa River begins in Oasis Valley, north of Beatty, and drains an area approximately 3,100 square miles (8,000 square kilometers) by the time it reaches Tecopa, California. Its course extends approximately 60 miles farther, before terminating in the Badwater Basin in Death Valley National Park (DOE 2008). Basin relief is approximately 8,000 feet, ranging from approximately 7,700 feet above sea level at Pahute Mesa, Nevada, to approximately 300 feet below sea level at Badwater Basin in Death Valley, California (Tanko and Glancy 2001).

There are three main reaches (upper, central, and lower) with associated tributaries identified for the Amargosa River. The upper reach includes Thirsty Canyon Wash and Beatty Wash. The central reach includes Fortymile Wash, Tonopah Wash, and Carson Slough. The lower reach includes China Ranch Wash and Salt Creek.

Within the lower reach of the Amargosa River, small thermal springs near Shoshone and Tecopa, California contribute flow to the river. These springs also add to river flow in the reach between Tecopa and Dumont Sand Dunes. A 4-mile segment of the Amargosa River in this area was designated "wild and scenic" under the Omnibus Public Land Management Act of 2009. This Act, signed by President Barack Obama on March 30, 2009, provides protection of riverside land along both sides of a river in order to preserve the river's free-flowing nature.

The proposed Project is located within the Fortymile Wash watershed. Fortymile Wash drains the southern part of Pahute Mesa, the western part of Jackass Flats, and the eastern slopes of Yucca Mountain (Tanko and Glancy 2001). Approximately 93 miles long, Fortymile Wash drains an area of roughly 310 square miles. North of the Project site, near US 95, the Fortymile Wash channel changes from moderately confined to a poorly confined network of channels (Beck and Glancy 1995). This poorly defined network continues downstream to the confluence with the Amargosa River, approximately 3 miles south of the southern end of the Project site.

The nearest surface water impoundments are Peterson Reservoir, Crystal Reservoir, Lower Crystal Marsh, and Horseshoe Reservoir in the Ash Meadows National Wildlife Refuge (NWR), approximately 7 miles southeast of the Project area. The largest of these is Crystal Reservoir, a manmade impoundment at Ash Meadows, which captures the discharge from several springs in the area and has a capacity of 1,500 acre-feet (1.8 million cubic meters). Crystal Reservoir and other smaller pools in Ash Meadows drain to the Amargosa River through Carson Slough (DOE 2008).

3.4.5.2 Flood Occurrence

Streamflow characteristics of the Amargosa River have been studied for at least 45 years, with USGS stream gage data being recorded since 1964 near Beatty (USGS streamflow gauging station 10251220). Other stream gages and thermal detection gages have been installed along the Amargosa River; though they have not been continuously monitored.

Streamflow characteristics of Fortymile Wash have been similarly studied for the past 26 years; primarily within the Nevada Test Site, directly north of the Project area and US 95, and to a lesser extent in Amargosa Valley. USGS stream gage data is available at the Nevada Test Site southwest boundary, upstream of US 95 (USGS streamflow gaging station 10251258).

As part of the DOE site characterization, investigations for Yucca Mountain (studies pertaining to surface-water runoff, including the potential for flooding in Fortymile Wash and Amargosa River) have been conducted (Beck and Glancy 1995; Tanko and Glancy 2001). Although flow in the Fortymile Wash is rare, the area is subject to flash flooding from intense summer thunderstorms or sustained winter precipitation. When these events occur, intense flooding can include mud and debris flows, in addition to water runoff in both the Fortymile Wash and Amargosa River (Blanton 1992).

At least three major flood events have occurred for which it is well documented that flows from Fortymile Wash and Amargosa River completely traversed the Amargosa Desert from the Nevada Test Site to Death Valley. These were in 1969, 1995, and 1998 (USGS 2008). The 1969 flood was the largest, producing a peak flow that exceeded the median annual peak flow by more than two orders of magnitude (Stonestrom et al. 2007). Beck and Glancy (1995) documented conditions during March 1995 and February 1998, when Fortymile Wash and the Amargosa River flowed simultaneously through their primary channels to Death Valley. During both floods, surface water from the Nevada Test Site flowed to the Amargosa River mainly via the Fortymile Wash, and road overflows were observed at similar locations (Tanko and Glancy 2001). In Fortymile Wash, a peak streamflow of approximately 3,000 cubic feet per second in 1995 severely scoured and eroded the channel, causing extensive road damage on the Nevada Test Site as well as to US 95 (Beck and Glancy 1995).

3.4.5.3 Surface Water Quality

Section 305(b) of the CWA requires states to make water quality assessments and provide water quality reports to the EPA; and CWA Section 303(d) requires states to identify waters, through their Section 305(b) water quality assessments, that do not or are not expected to meet applicable water quality standards with federal technology-based standards alone. Under CWA Section 303(d), States are also required to develop a priority ranking for these waters which takes into account the severity of the pollution and the designated uses of the waters. Once this listing and ranking of impaired waters is completed, States are required to develop Total Maximum Daily Loads (TMDL) for these waters in order to achieve compliance with the water quality standards. Nevada's 2006 Section 303(d) list of impaired waters shows no CWA Section 303(d) impaired waters in the Project area.

3.4.6 Groundwater Resources

This section characterizes the local groundwater conditions and their relationship to the regional groundwater system. The geographic extent evaluated for the regional groundwater system includes the Death Valley Regional Flow system. Groundwater systems are directly linked to the geological conditions described in Section 3.1.5 – Geological Hazards and Mineral Resources.

Important characteristics of the groundwater system include recharge zones (areas where water infiltrates from the surface and reaches the saturated zone), discharge points (locations where groundwater reaches the surface), unsaturated zones (the portion of the groundwater system above the water table), saturated zones (the portion of the groundwater system below the

water table), and aquifers (water-bearing layers of rock that provide water in usable quantities) (DOE 2008).

3.4.6.1 Regional Setting

The regional groundwater flow system is divided into sub-basins or regions. Sub-basins are delineated primarily on the basis of (1) the location of major discharge areas (springs and wet playas), (2) the location of recharge areas (zones of substantial precipitation), (3) occurrences of rocks with low water-transmitting potential (low permeability), (4) regional hydraulic gradients determined from measurements of water level, and (5) comparisons of the chemical and isotopic composition of water (Laczniak et al. 1996).

The project is located in the Central Death Valley sub-region (see Figure 3-6). In this sub-region, the dominant flow paths are associated with major regional or intermediate discharge areas and are grouped into three groundwater basins: Alkali-Flat-Furnace Creek sub-basin, Ash Meadows sub-basin, and the Oasis Valley sub-basin. The Project area is in the Alkali Flat-Furnace Creek sub-basin. The sub-basin is approximately 2,800 square miles and covers a large part of the western half of the Nevada Test Site (Laczniak et al. 1996).

3.4.6.2 Regional Groundwater Occurrence

Within the Central Region of the Death Valley Regional Groundwater Flow System, groundwater occurs within two different subsurface geologic environments: (1) the sediments that have filled the basins to their current elevations (basin-fill deposits) and (2) the bedrock, where it is sufficiently fractured, underlies these sediments, and comprises the surrounding mountains. Groundwater is therefore stored and conveyed through two principal aquifer systems: (1) saturated, poorly consolidated shallow basin-fill deposits and (2) the underlying fractured-carbonate rock aquifer, including sedimentary carbonate (limestone, dolomite) or volcanic (tuff, rhyolite, basalt) rocks (Belcher 2004).

Groundwater occurs at varying depths under the entire Amargosa Desert, ranging from land surface in the spring areas of Ash Meadows to roughly 300 feet below ground land surface in the Lathrop Wells area (Buqo 2002). Under the Amargosa Farms area, where the proposed Project would be located, the depth to groundwater ranges from approximately 135 feet below land surface in the northwest to approximately 90 feet below land surface near the Longstreet Inn at the California/Nevada state line (Buqo 2002). The primary aquifer underlying Amargosa Valley is the valley-fill sediments comprising alluvium, Tertiary-aged lake bed deposits, older conglomerates, and volcanic units. All of the groundwater supplies in the Amargosa Farms area are drawn from this source (Buqo 2006).

In the Ash Meadows area, the primary aquifer is made up of Paleozoic rocks, including the rocks of the upper carbonate aquifer system, the upper clastic aquitard, and the lower carbonate aquifer system (Buqo 2002). The carbonate-rock aquifer covers almost 100,000 square miles of the Great Basin (Plume 1996), and is the principal regional aquifer in the Death Valley groundwater flow system. Groundwater flow in the carbonate aquifer moves laterally across basins as interbasin flow (Laczniak et al. 1996).

3.4.6.3 Groundwater Movement and Storage Characteristics in the Amargosa Desert

In the Alkali Flat–Furnace Creek sub-basin, groundwater moves through volcanic rock aquifers in the north and carbonate rock aquifers in the south, towards discharge areas in the southern and southwestern portions of the basin (Belcher 2004).

Groundwater in the Amargosa Desert is stored and conveyed principally through the saturated unconsolidated basin-fill deposits which consist of sand, silt, gravel, and clay (Belcher 2004). Hydraulic conductivity ranges from 0.02 to 140 feet per day in basin-fill deposits in Amargosa Desert (Harrill and Prudic 1998). Hydraulic conductivities typically are larger toward the margins of the valleys and smaller near the basin axis (Plume 1996). Hydraulic conductivity refers to the ability of geologic material to transmit water, and it is an important factor in determining: (1) the average linear rate, or velocity, of groundwater flow; (2) the hydraulic gradient or "slope" of the water table; (3) the potential amount a well is capable of pumping (well yield); and 4) the resulting spatial pattern of groundwater decline that results from pumping a well (Kasenow 2001).

3.4.6.4 Groundwater Recharge and Discharge

There are several potential sources of recharge for the alluvial aquifers in the Amargosa Desert. One source is direct recharge from precipitation falling on the alluvial areas. Recharge may also occur from infiltration of intermittent surface waters of the Amargosa River and washes draining off the mountains (Savard 1998; Beck and Glancy 1995). A third source of recharge to alluvial aquifers is infiltration or leakage from underlying bedrock aquifers. Human activity may also provide a source of recharge to the aquifers, chiefly by return infiltration of irrigation (Stonestrom et al. 2003).

Groundwater discharges from the Amargosa Valley Hydrographic Basin include: (1) discharge from springs, (2) evapotranspiration, (3) flows across a groundwater flow system boundary to an adjacent system, and (4) groundwater pumping from underground sources. These functions are described in the following section. Activities such as groundwater pumping for agricultural uses and human consumption remove water from storage in a groundwater system, thereby reducing hydraulic heads which are measured as groundwater levels in open wells. Groundwater pumping also can affect streams or springs in direct hydraulic connection with the groundwater system, because declining groundwater levels can lead to increased recharge from streams and decreased spring flow.

3.4.6.5 Regional Springs

Several springs of regional importance lie outside of the immediate Project area. These include more than 30 seeps and springs in the Ash Meadows NWR, including Devils Hole, a 40-acre detached unit of Death Valley National Park. Devils Hole provides habitat for the only naturally occurring population of the endangered Devils Hole Pupfish (*Cyprinodon diabolis*).

Springs in the Ash Meadows NWR are created by groundwater discharge along the Ash Meadows fault system (Denny and Drewes, 1965). The Ash Meadow fault system trends

southeast to northwest through the eastern portion of the Ash Meadows NWR. Groundwater discharging at Ash Meadows originates from areas to the north and east and is transported into the area through the regional carbonate rock aquifer. Winograd and Friedman (1972) suggested that 65 percent of the spring-fed waters originate from the Spring Mountains and Sheep Range, 30 to 60 miles to the east; and 35 percent comes from underflow from the Pahranagat Valley, approximately 90 miles northeast of Ash Meadows.

Other springs in the Ash Meadows area discharge from the valley-fill aquifer, which is derived from and connected to the carbonate aquifer, but is overlain by valley-fill sediments. The total annual discharge of these springs is estimated at approximately 17,000 afy (Walker and Eakin 1963; Laczniak et al. 1999).

In the late 1960s and early 1970s, ranching and farming operations in the Ash Meadows area resulted in a decline in water levels in Devils Hole, which threatened the survival of the Devils Hole Pupfish. As a result, the NPS filed a lawsuit against the land owner, Cappaert Ranch, to restrict groundwater pumping.

In 1973 the U.S. District Court granted a preliminary injunction preventing pumping that would lower the pool level more than 2.98 feet below the datum. The injunction was made permanent by the U.S. District Court, and upon appeal the Supreme Court affirmed the lower court decision. In 1978 the U.S. District Court issued a permanent injunetion to limit pumping to maintain a daily mean water level of 2.69 feet below the datum, based on scientific studies.

By 1988 the pool level had recovered to roughly 0.98 feet below the pre-pumping level when it began to decline. Concerns were raised that in the intermediate to long-term future the pool level would fall below the court mandated minimum level. Since 1989, to protect groundwater sources that feed the springs and seeps in the Ash Meadows NWR area, the USFWS has acquired 57 permitted or certificated water rights, totaling over 19,250 afy in the Amargosa Desert Hydrographic Basin, making the USFWS the largest water rights holder in the basin.

To further protect federally reserved water rights at Devils Hole, the Nevada State Engineer issued Order 1197 on November 4, 2008. Information provided during the administrative hearing showed the water level in Devils Hole to be only 0.6 to 0.7 feet above the threshold level mandated by the U.S. District Court. The State Engineer ruled that the conditions warranted the curtailment of future appropriations of underground water and additional regulations of change applications within portions of the Amargosa Desert Hydrographic Basin. The State Engineer ordered, with exceptions, that "any applications to appropriate additional underground water and any application to change the point of diversion of an existing groundwater right to a point of diversion closer to Devils Hole, described as being within a 25-mile radius from Devils Hole within the Amargosa Desert Basin, will be denied."

Exceptions to the Order include:

- Any application within the described area that seeks to change an existing point of diversion closer to Devils Hole but remains: (1) within its existing place of use and (2) is no more than 1/2 mile from its original point of diversion.

- Those applications filed which seek to appropriate 2.0 afy or less may be considered and shall be processed subject to NRS 533 and 534.

- Projects that require changes of multiple existing rights; the State Engineer may compare the net impact of the proposed changes to Devils Hole to the impacts of the base rights to Devils Hole. If the net impact of the proposed changes is the same or less than the base rights impacts, as determined by the State Engineer, such change applications may be considered and shall be processed subject to NRS 533 and 534. In no such case shall new points of diversion be allowed within 10 miles of Devils Hole.

- Those applications for environmental permits filed pursuant to NRS 533.437 to 533.4377, inclusive.

- Those applications filed pursuant to NRS 533.371.

The proposed Project is located within the 25-mile radius of Devils Hole. However, since the Proponent intends to use existing water rights, and is not moving the point of diversion closer to Devils Hole, their actions would not result in non-compliance of Order 1197.

3.4.6.6 Evapotranspiration

Evapotranspiration is the combined process of evaporation and the transpiration of water through plant tissue into the atmosphere. Evapotranspiration is a critical component of the water cycle, and thus an important component of many hydrological and climate models. However, evapotranspiration is difficult to measure directly. It is calculated from climate date, factors representing vegetation characteristics, and water supply.

Historically, estimates of evapotranspiration in the Death Valley Regional Flow System were computed as part of regional groundwater assessments (Malmberg and Eakin 1962; Eakin 1963; Pistrang and Kunkel 1964; Malmberg 1967; Rush 1968). These regional assessments estimated annual evapotranspiration losses as the product of the acreage of phreatophytes within a discharge area and an annual evapotranspiration rate representative of the vegetation and soil conditions of the discharge area (Laczniak et al. 1999).

Estimates of the total amount of evapotranspiration in the Amargosa Desert Hydrographic area vary. Walker and Eakin (1963) estimated 24,000 acre-feet of annual evapotranspiration in the Amargosa Desert. Of this total, approximately 10,500 acre-feet were determined to be from Ash Meadows (Winograd and Thordarson 1975); and the remainder from other smaller areas of groundwater discharge found throughout the Amargosa Desert.

Recent studies of evapotranspiration rates for vegetation and soil conditions in the regional area (Johnson 1987; Czarnecki 1997; Laczniak et al. 1999; Nichols 2000) indicate rates somewhat different than those presented in earlier studies. Based on the updated data, Laczniak et al. (1999) estimated 22,000 acre-feet of annual evapotranspiration in the Ash Meadows area.

3.4.6.7 Groundwater Pumping

The perennial yield of the Amargosa Valley hydrographic basin is estimated at 24,000 afy (Walker and Eakin 1963). Perennial yield refers to the amount of usable water from a groundwater aquifer that can be withdrawn economically and consumed each year for an indefinite period. All water in Nevada may be appropriated for beneficial use as provided in NRS 533 and 534. Irrigation, mining, recreation, commercial/industrial and municipal uses are examples of beneficial uses. Table 3-7 lists annual duty for the various types water use in the Amargosa Desert Hydrographic Basin.

Table 3-7 Summary of Groundwater Use in the Amargosa Desert Hydrographic Basin

Manner of Use	Active Annual Duty (Acre-Feet)	Pending Annual Duty (Acre-Feet)
Commercial	1,443.35	454.30
Domestic	3.22	0.0
Irrigation - Domestic	1,942.16	0.0
Irrigation	18,930.40	160.10
Mining and Milling	1,913.49	0.0
Municipal	431.79	0.0
Quasi-Municipal	577.59	5.0
Wildlife	18.84	0.0
Total	**25,260.86**	**619.40**

* May include supplemental duties as well as duties associated with applications to change
Source: NDWR 2009c

Groundwater rights within the Amargosa Desert Hydrographic Basin are associated with municipal, private domestic, mining, agricultural use, and support for biological communities protected by the National Park Service in Death Valley and by the USFWS at Ash Meadows NWR.

The primary use of groundwater in the Amargosa Desert Hydrographic Basin is for agricultural irrigation. Irrigation in the Amargosa Farms area began on a limited basis around 1917 and continued on a modest scale until roughly 1954. Intensive agriculture in Amargosa Desert began in 1954 as land was patented under the Desert Land Act (Moreo et al. 2003), and irrigated acreage exceeded 2,000 acres by 1965. Between 1954 and 1965, the number of wells grew by roughly 150 to support agricultural production (Laczniak et al. 1999; Stonestrom et al. 2003). Farming and the associated irrigated acreage contracted and expanded twice between 1965 and 1998 (Moreo et al. 2003).

Total groundwater withdrawal from Amargosa Desert decreased from 1998 (21,100 acre-feet) to 2001 (14,100 acre-feet), and then increased through 2003 (17,600 acre-feet). Total groundwater withdrawal averaged 16,800 acre-feet from 1994 through 2003 and ranged from 14,100 to 21,100 acre-feet. The annual variation in total groundwater withdrawal is attributed primarily to crop and irrigation cycles. Alfalfa fields typically are allowed to fallow 2 years during a 7-year period. Other fields are irrigated once every 5 years to demonstrate beneficial use and maintain water rights (Moreo et al. 2003). To date, more than 1,000 water supply wells have been drilled in the Amargosa Desert hydrographic basin (NDWR 2009c).

It is important to note that there is a level of uncertainty associated with the NDWR pumpage inventory. Pumping estimates for unmetered wells are generally approximate and are based on rudimentary records, or consumptive use estimates made by the NDWR as part of their annual water use inventories. In 2003, 12 percent of reported irrigated acreage for Amargosa Desert was metered (Moreo et al. 2003).

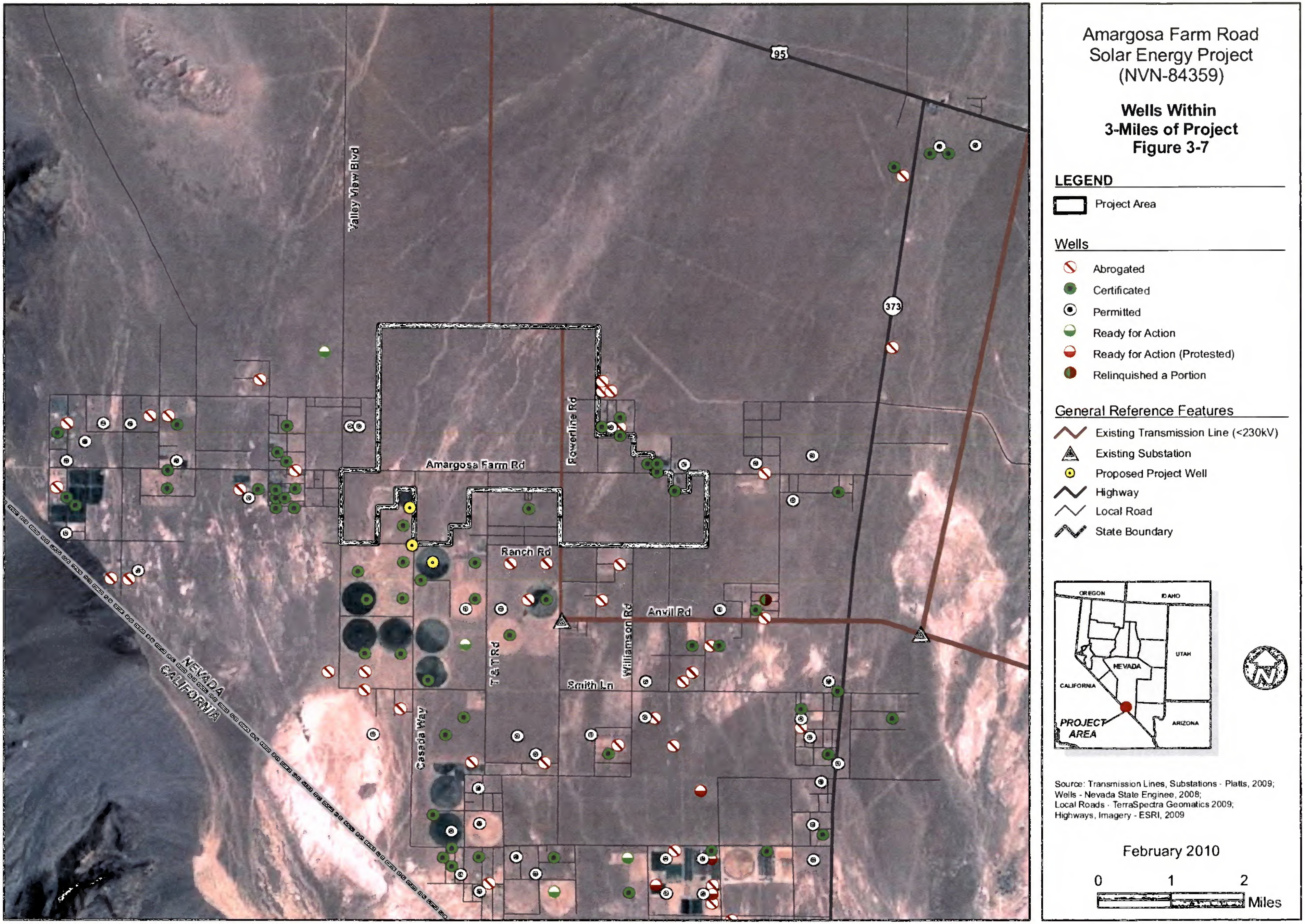
Groundwater withdrawals for non-irrigation use in Amargosa Desert ranged from 11 to 16 percent of total groundwater withdrawals between 1998 and 2003. Groundwater withdrawals in Amargosa Desert other than irrigation were predominantly from American Borate Mine, Industrial Mineral Ventures, and Barrick Bullfrog Mine. Groundwater use for mining decreased from 2,400 acre-feet (11 percent of total water use) in 1998 to 1,200 acre-feet (7 percent of total water use) in 2003, because of the closure of the Bullfrog Mine owned by Barrick Gold Corporation.

Although most residents in the Amargosa Valley area rely on individual wells for their water supply, annual groundwater withdrawal from domestic wells accounts for less than 3 percent of the total groundwater pumping in the basin. In 2000, there were 378 domestic wells listed in the NDWR database. By the end of 2008, a total of 517 domestic wells had been drilled in the Amargosa Desert Hydrographic Basin. It is unknown how many of these wells are currently being pumped. Domestic and public (quasi-municipal) water use from 1998 to 2003 was less than 5 percent of the total water use. Wells within 3 miles of the Project area are shown on Figure 3-7. During the biological surveys conducted in the Spring 2009, several water wells were found scattered throughout the site. Most of these wells have either been plugged or have welded covers on the casing; at least one well was uncapped. It is assumed these wells are associated with past agricultural fields and desert land entrees that have been filed with BLM. Prior to the enactment of FLPMA, trespass agricultural fields were established throughout the Amargosa Valley. Over the years, these fallow agricultural fields have reverted back to desert scrub communities.

Groundwater Modeling

GeoTrans, Inc. was contracted to develop a groundwater flow model and hydrographic analysis to compare how historic and future pumping (up to 200 years) in the Amargosa Desert Hydrographic Basin, coupled with conversion of 400 afy of water rights from existing agricultural use to industrial use, would affect water levels in Devils Hole.

A numerical groundwater flow model was used to evaluate the potential regional effects to water resources associated with the proposed groundwater development included in the Proposed Action (400 afy). The results of the groundwater modeling are provided in Appendix B. The groundwater flow model was also used to simulate the No Action scenario or existing pumping in the Amargosa Desert Hydrographic Basin. The following sections provide a summary of the groundwater modeling and predictive scenarios.



Amargosa Farm Road
Solar Energy Project
(NVN-84359)
Wells Within
3-Miles of Project
Figure 3-7
LEGEND
Project Area
Wells
Abrogated
Certificated
Permitted
Ready for Action
Ready for Action (Protested)
Relinquished a Portion
General Reference Features
Existing Transmission Line (<230kV)
Existing Substation
Proposed Project Well
Highway
Local Road
State Boundary
OREGON
IDAHO
UTAH
NEVADA
CALIFORNIA
ARIZONA
PROJECT AREA
Source: Transmission Lines, Substations - Platts, 2009;
Wells - Nevada State Engineer, 2008;
Local Roads - TerraSpectra Geomatics 2009;
Highways, Imagery - ESRI, 2009
February 2010
0
1
2
Miles
95
373
Valley View Blvd
Amargosa Farm Rd
Powerline Rd
Ranch Rd
Anvil Rd
Williamson Rd
T & T Rd
Smith Ln
Casada Way
NEVADA
CALIFORNIA

Groundwater Model Background

Groundwater flow modeling was performed using the Death Valley Regional Flow System (DVRFS) Model (Belcher 2004). The DVRFS model is the only existing model of the study area. This model was calibrated to both pre-pumping and pumping conditions. The Amargosa Desert Hydrograghic Basin is one of the areas covered by the model in which there has been significant pumping; water-level changes measured in the area were used to guide calibration of the model.

Documentation of the DVRFS model and report is available online (http://pubs.usgs.gov/sir/2004/5205/). In addition to the report itself, there are many supporting documents on geologic and hydrologic investigations performed to support development of the model. Hydrologic investigations relevant to the Amargosa Desert include measurements of evapotranspiration at Ash Meadows, in Death Valley, and in Oasis Valley; estimation of evapotranspiration at Franklin Lake playa and near Franklin Well (Amargosa River); construction of a dataset for pumping in the Amargosa Desert (and other areas); and measurement of groundwater recharge underneath the Amargosa River and irrigated fields in the Amargosa Farms area.

The model is developed with MODFLOW-2000, using a grid with a lateral spacing of 1,500 meters, and a variable vertical spacing. There are 16 model layers, with an interpretation of the water table used as a reference surface from whieh to base the elevation of the upper model layer. A large number of layers is needed to capture the geologic complexity incorporated into the geologic framework model, which is itself a simplification and interpretation of the actual geology. The model assumes that all layers are fully saturated and that dewatering does not occur. Thus, transmissivities do not become smaller with drawdown, and the model is approximately mathematically linear. Because the Drain package is used to simulate springs, the model would not be strictly linear if drawdown is sufficient to cause water levels in a cell to decrease below the specified elevation of a drain. In addition, if drawdown is sufficient to cause appreciable decreases in the saturated thickness of the aquifer being pumped, the model will tend to underestimate the drawdown and overestimate the productivity of the aquifer.

The model was calibrated using a non-linear regression technique which optimizes modeling parameters to minimize the objective function, which was the sum of squared weighted residuals. A residual is defined as the difference between the observed (or estimated) value for a calibration target, and the corresponding simulated value. Hydraulic heads, water-level changes, discharge rates in spring areas, and lateral boundary fluxes were used as calibration targets. As the objective function represents the entire model, rather than concentrating on the Amargosa Farms and Ash Meadows areas, the agreement of simulated water-level change and measured change at Devils Hole is reasonable, but could be improved.

Following publication of the DVRFS report, a minor error was detected in the geologic model in the Oasis Valley area. The simulations reported here were performed with the updated model, which was downloaded from the web site provided above. Also, the modeling pumping and return flow datasets were updated in 2003 to include updated estimates of groundwater withdrawal and return flow from irrigation (Moreo and Justet 2008). This updated dataset was also used in the simulations reported here.

Groundwater Model Limitations

As stated earlier, the DVRFS model is the only existing groundwater flow model of the study area. Before evaluating predictions of drawdown at Devils Hole or change in discharge at Ash Meadows using the DVRFS model, the reader needs to be aware of the limitations of using a regional-scale groundwater model to evaluate potential water resource impacts at springs or other sites (e.g., Devils Hole) that are local in scale (feet). These limitations include 1) model grid size (1,500 meter x 1,500 meter), 2) calibration to regional groundwater flow conditions, 3) estimates in historic pumping dataset and 4) simplification of geology. The DVRFS model report (p. 350) states "the use of the (DVRFS) model to address regional-scale issues or questions is the most appropriate use of the model." Thus, using the DVRFS model to predict hydraulic heads or water-level change at Devil's Hole is not an appropriate use of the model. However, the DVRFS model gives you a qualitative sense of how water levels change over time at a given location, not quantitative.

Before conducting predictive modeling simulations, it is important to compare calculations of water-level change at Devils Hole with measured changes. Figure 2 in Appendix B, shows the comparison through 2003, the end of the updated pumping, and the return flow dataset. Provisional water-level data after 1989 was received from Jennifer Back (2006). Several features should be noted:

- Both the measurement dataset and the simulated levels show declining water levels prior to the start of significant pumping in the Ash Meadows area. The simulated rate of decline is faster than the observed rate. The model is also slower to respond to changes in pumping rates.

- The effects of pumping in Ash Meadows are readily apparent in both the measurements and simulated results beginning in approximately 1970, but the simulated change is greater than the measured change.

- In the original 1998 model, during three periods beginning approximately in 1975, 1987, and 1998, there are simulated declines that do not occur in the measured values. The model values do not recover as much as the measurements following cessation of nearby pumping. In the updated 2003 model, the simulated decline starting around 1975 still remains to a lesser degree, but the other two declines have been corrected. We suspect there is still an error in the historical pumping dataset prepared by the USGS for the 1975 period.

- The effects of seasonal barometric changes, seasonal pumping, and earthquakes are not incorporated in the model.

- Beginning in 1989, until 2003, the updated 2003 model simulates a decline in water levels.

In summary, the DVRFS model overpredicts the drawdown caused by historical local pumping by approximately 30 percent. Because of an apparent error in the pumping dataset, it is not

definite whether the model would produce an effect from other, more distant pumping, but the later time results suggests otherwise.

Groundwater Model Simulations and Assumptions

After updating the USGS DVRFS model through 2003 with the revised pumping and return flow dataset, groundwater modeling scenarios using this updated model were conducted. Based on discussions with Project team members, the following modeling scenarios were simulated as part of this Project:

- Run existing DVRFS model an additional 200 years past the transient calibration period with 2003 pumping (i.e., No Action).
- Same as Scenario 1, except add the proposed action of 400 afy from the existing three wells south of the site from 2010-2039 (i.e., Proposed Action).

The following assumptions were made during the modeling scenario simulations:

- No climatic effects – The current recharge dataset was used for the 200-year simulations. The effect of water rights users irrigating more or less due to climate than 2003 amounts was not estimated.
- The Project groundwater withdrawal of 400 afy was added to the 2003 pumping dataset since the USGS estimate for 2003 was below the duty (1,328 afy), minus the Project pumping (400 afy) for the three wells. It is assumed that existing pumping from the three wells plus the 400 afy from the Project would not exceed the duty of 1,328 afy in the 200-year simulations.
- Water infiltration from mirror washing was not accounted for because it is unknown what amount would ultimately end up as groundwater recharge.

Groundwater Model Summary

Comparison of simulated and observed changes in water levels at Devils Hole through 2003 indicated that the DVRFS overestimated the change in water level caused by pumping in Amargosa Basin. There may be an error in the historical pumping dataset that affects this comparison. Although the model could be improved by additional work, specifically in the Amargosa Desert and Ash Meadows areas, the pumping estimates developed for the model are reasonable.

The simulations predict that the three Project wells will cause water levels in Devils Hole to decline less than 0.05 of a foot after 200 years. When considering these predictions, it is important to recognize that the model overpredicted the decline in water levels caused by pumping in the Amargosa Desert Hydrographic Basin and cannot accurately predict hydraulic heads or water-level changes at Devil's Hole due to its original objective of modeling groundwater flow at a regional scale.

The model predicts that the Project pumping will reduce the discharge rate from springs at Ash Meadows a negligible amount of 7 afy or 0.05 percent.

Groundwater pumping in the Amargosa Farms area has caused tens of feet of drawdown near the pumping wells. Simple modeling using the Theis equation and superposition, coupled with regression procedures, indicates that the pumping in the Amargosa Farm area is the primary cause of the present-day drawdown at Devils Hole.

3.4.6.8 Groundwater Quality

With the exception of radionuclide contamination at the Nevada Test Site, the water quality of the surface and groundwater resources in the ROI is generally good. Elevated concentrations of fluoride, sulfate, arsenic, and total dissolved solids are present in some areas, and traces of naturally occurring uranium are also present (DOE 2008). Preliminary water quality tests obtained for one of the three wells to be used for the proposed Project indicate the well water meets EPA drinking water standards for calcium, magnesium, and siliea. No other minerals were tested for at this time.

3.5 Noise

This section discusses the existing environment and the regulatory framework associated with the proposed Project. This analysis evaluates noise impaets from the construction and operation of the solar facility to the Project area and the areas immediately adjacent to the Project site.

3.5.1 Regulatory Framework

There are no federal, state, or local laws or regulations directly regulating off-site (community) noise. The Project area is subject to the management guidance included in the Las Vegas RMP/EIS, which does not contain noise regulations or standards. Also, Nye County currently does not have noise regulations or standards.

For this condition, the EPA (1974) has developed and published criteria for environmental noise levels with a directive to protect public health and welfare with an adequate margin of safety. This EPA criterion (*Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*) was developed to be used as an acceptable guideline when no other local, county, or state standard has been established. However, the EPA criterion is not meant to substitute agency regulations or standards where states and localities should use the developed criteria accordingly to their individual needs and situations.

The EPA established its criteria using the day-night average sound exposure (Ldn) metric. This metric is a 24-hour average noise level calculated by obtaining the daytime noise level from the hours of 0700 to 2200 and applies a 10 decibel (dB) penalty for the more restrictive quietest nighttime noise levels between the hours of 0000 to 0700, and 2200 hours to 2400 hours.

According to the EPA guidelines, an Ldn of 45 A-weighted decibel (dBA) indoors and 55 dBA outdoors for residential areas is identified as the maximum allowable noise level which no effects on public health and welfare occur due to interference with speech or other activity. These levels would also protect the vast majority of the population under most conditions against annoyance, in the absence of intrusive noises with particularly aversive content. Table 3-8 was published by the EPA and summarizes the maximum allowable noise level for specified areas.

Table 3-8 Summary of Noise Levels Identified as Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety

Effect	Level	Area
Hearing Loss	Leq(24) =< 70 dB	All Areas
Outdoor activity interference and annoyance	Ldn =< 55 dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use
	Leq(24) =< 55 dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	Ldn =< 45 dB	Indoor residential areas
	Leq(24) =< 45 dB	Other indoor areas with human activities such as schools, etc.

This project will also be governed by federal OSHA hearing conservation noise exposure regulations. These regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which a worker is exposed. The Federal OSHA Occupational Noise Exposure standard states:

1910.95(b)(1)

When employees are subjected to sound exceeding those listed in Table 3-9, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table 3-9, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

1910.95(b)(2)

If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

Table 3-9 Permissible Noise Exposures[1]	
Duration per day, hours	**Sound level dBA slow response**
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

[1] When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: C(1)/T(1) + C(2)/T(2) C(n)/T(n) exceeds unity, then the mixed exposure should be considered to exceed the limit value. C(n) indicates the total time of exposure at a specified noise level, and T(n) indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

3.5.2 Data Collection Methods

Noise is generally defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance; interference with speech communication; sleep disturbance; and, in the extreme, hearing impairment. An assessment of the potential for a project to result in adverse noise effects requires an evaluation of several factors. These factors include an inspection of the site's general setting (such as isolated, rural, suburban, or urban); nature of the existing ambient noise sources or activities occurring in those settings; proximity of the receptor to the existing ambient noise source or activity; time of day; and various sound-attenuating factors such as vegetation, ground absorption, topographic features, buildings, and atmospheric conditions.

Noise standards and sound measurement equipment have been designed to account for the sensitivity of human hearing to different frequencies. This is accomplished by applying "A-weighted" correction factors. This correction factor is widely applied in the industry and is known to de-emphasize the very low and very high frequencies of sound in a manner similar to the response of the human ear. The primary assumption is that the dBA is a good correlation to a human's subjective reaction to noise.

Noise is measured in units of dB on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The dBA scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3-dBA is barely perceptible to average human hearing. A 5-dBA change in noise level, however, is clearly noticeable. A 10-dBA

change in noise level is perceived as a doubling or halving of noise loudness, while a 20-dBA change is considered a dramatic change in loudness. Table 3-10 provides typical instantaneous noise levels of common activities in dBA.

Table 3-10 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Fly-over at 1,000 feet	100	
Gas Lawn Mower at 3 feet	90	
Diesel Truck at 50 feet, at 50 miles per hour (mph)	80	Food Blender at 3 feet Garbage Disposal at 3 feet
Noisy Urban Area, Daytime Gas Lawn Mower at 100 feet	70	Vacuum Cleaner at 10 feet
Commercial Area Heavy Traffic at 300 feet	60	Normal Speech at 3 feet
Quiet Urban Daytime	50	Large Business Office, Dishwasher in Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	30	Library
Quiet Rural Nighttime	20	Bedroom at Night, Concert Hall (Background)
	10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

3.5.3 Existing Conditions

The Project area is located within a rural, sparsely populated area. The existing ambient noise environment in the vicinity of the Project site is mainly made up of natural sounds, vehicle noise associated with the small roadway segments, and community activity in the vicinity of the Project site, as well as noise associated with the Amargosa Valley Elementary School and over flight aircraft traffic. There are no other identified noise sources located within the vicinity of the Project site.

To confirm and document the current community ambient noise conditions at the site, two environmental noise monitors were placed on the Project site to capture the rise and fall of ambient noise conditions in the area. One noise meter was located along the eastern edge of the property and the second noise meter was placed in the center of the proposed eastern powerblock area. The noise monitors were programmed to record simultaneously in the appropriate data acquisition format for depicting the significant daily background noise levels prevalent within the area of the proposed Project site. The two 24-hour noise monitors were programmed to record continuously throughout a typical business day on Thursday, December 3, 2009; the results are shown in Table 3-11.

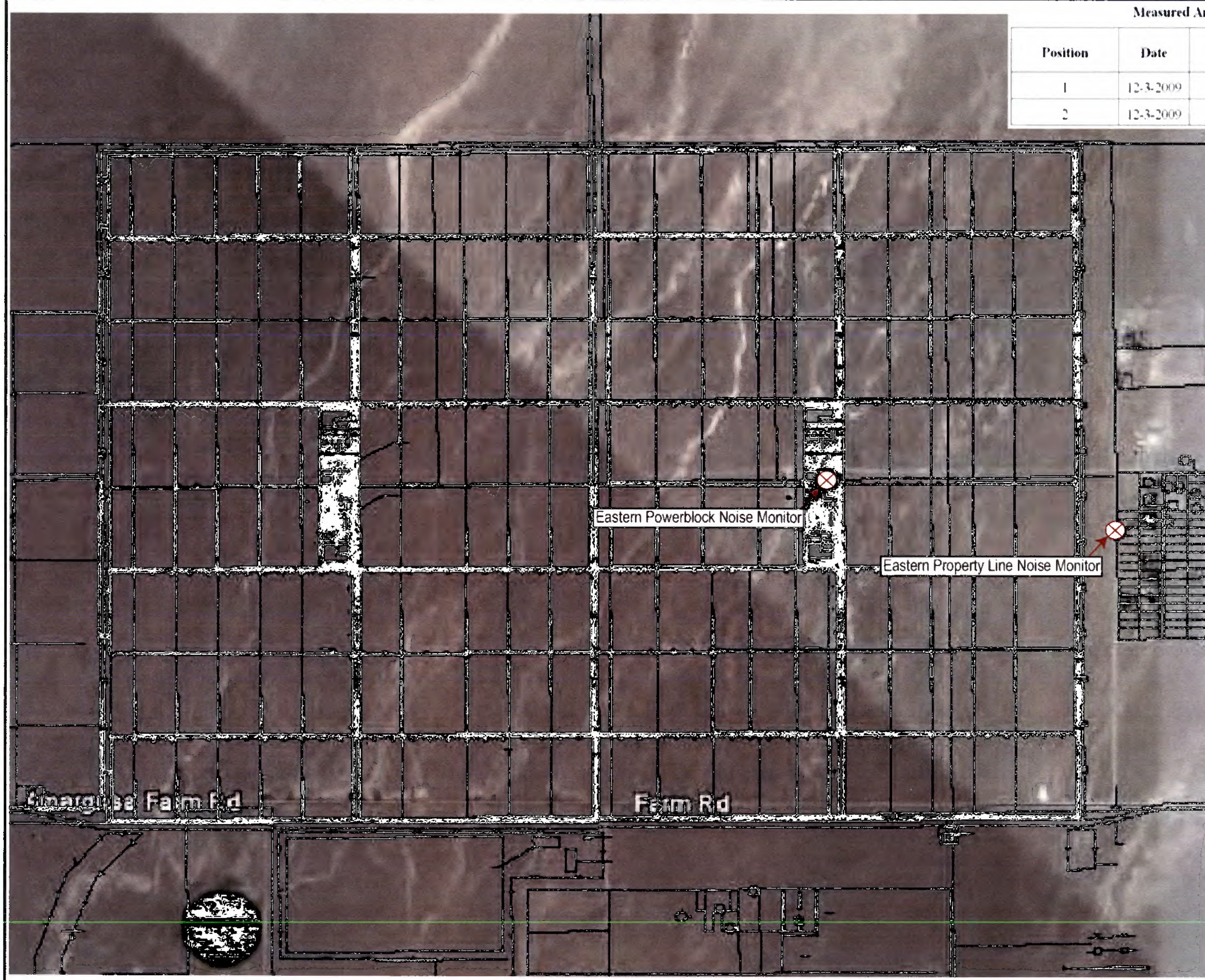
Table 3-11 Measured Ambient Noise Levels Over a 24-Hour Period

Position	Date	Location	24 Hour L_{EQ} (dBA)	Ldn (dBA)
1	12-3-2009	Eastern Property Line	34.5	39.7
2	12-3-2009	Eastern Power Block Area	33.0	41.4

The two continuous 24-hour sound level measurements (Ldn, A-Weighted) range from a worst-case noise impact of 41.4 dBA Ldn at the center of the proposed eastern powerblock area, down to the quietest noise level of 39.7 dBA Ldn at the eastern property line. During the on-site noise measurements, start and end times were recorded as well as any significant and background noise sources in the area. The 24-hour sound level measurements ran from midnight to midnight, integrating and logging data every 30 minutes. For a graphical representation showing the two 24-hour ambient noise monitoring locations and resultant measurement values see Figure 3-8.

Other field data gathered at the site includes measuring or estimating distances, angles-of-view, slopes, and site elevations. This information is subsequently verified using available maps and records. The sound level meters are field-calibrated prior to and following the noise measurements to ensure accuracy. All sound level measurements conducted and presented in this report are in accordance with and were made using a sound level meter that conforms to the American National Standards Institute (ANSI SI.4-1983 - R2001) specifications for sound level meters. All instruments are maintained with the National Bureau of Standards traceable calibrations.

Results of any investigations or field measurements and any findings presented in this report apply solely to conditions existing at the time when the investigative work was performed. It must be recognized that any such investigative or measuring activities are inherently limited and do not represent a conclusive or complete characterization. Conditions in other parts of the Project site may vary from those at the locations where data were collected. The ability to interpret investigation results is related to the availability of the data and the extent of the investigation activities.



Measured Ambient Noise Levels over a 24 Hour Period

Position	Date	Location	24 Hour L_{90} (dBA)	Ldn (dBA)
1	12-3-2009	Eastern Property Line	34.5	39.7
2	12-3-2009	Eastern Powerblock Area	33.0	41.4

Amargosa Farm Road Solar Energy Project
Amargosa Valley, Nevada

Global Image Showing Ambient Noise Measurement Locations and Data Results

ARCADIS

FIGURE
3-8

3.6 Biological Resources

3.6.1 Regulatory Framework

Numerous federal and state environmental regulations and legislative acts are applicable to biological resources. Following are those which are applicable to the Proposed Action within the Project area.

3.6.1.1 Endangered Species Act of 1973

The Endangered Species Act of 1973 (16 USC 1531 et seq.), as amended, provides for the conservation of federally listed plant and animal species and their habitats. The Endangered Species Act directs federal agencies to conserve listed species, and imposes an affirmative duty on these agencies to ensure that their actions are not likely to jeopardize the existence of a listed species or destroy their habitat. Each species listed is required to have designated critical habitat. Critical habitat is the specific geographic areas that are most essential for the conservation and protection of a listed species.

3.6.1.2 Bald Eagle and Golden Eagle Act

The Bald and Golden Eagle Protection Act (16 USC 668) applies primarily to taking, hunting, and trading activities that involve Bald or Golden Eagles. The act prohibits the "taking" of any individuals of these two species, as well as any part, nest, or egg. The term "take" as used in the Act includes "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb". For this Project, there are no anticipated impacts to Bald or Golden Eagles as no suitable habitat is present.

3.6.1.3 Migratory Bird Treaty Act of 1986

The Migratory Bird Treaty Act (MBTA) (16 USC 703) makes it unlawful to pursue, hunt, take, capture, kill, or possess any migratory bird or part, nest, or egg of such bird listed in wildlife protection treaties among the United States, Great Britain (on behalf of Canada), Mexico, Japan, and the former USSR. In addition, this act also contains a clause that prohibits baiting or poisoning of these bird species. The current list of species covered by the MBTA can be found in Title 50, CFR Section 10.13. Because many migratory bird species occur within the Project area, the MBTA applies to those bird species that may be affected during the construction and operation of the proposed Project.

3.6.1.4 Nevada State Protection of Christmas Trees, Cacti, and Yucca

The State of Nevada has a statute for the protection of Christmas Trees, Cacti, and Yucca (NRS 527.060-527.120). Under this statute it is illegal for any individual or company to cut, destroy, mutilate, remove, or possess any Christmas tree, cactus, yucca, or portions of these plants.

Additionally, it is illegal to sell any of these plants from any lands owned by or under the jurisdiction of the United States. This statute applies to any cacti or yucca on BLM managed lands that may be affected during construction of the proposed Project.

3.6.1.5 Nevada State Protection and Propagation of Native Fauna

The State of Nevada has a statute for the protection and propagation of native fauna (NRS 503.584-503.589). The purpose of this statute is to provide for the conservation, protection, restoration, and propagation of selected species and the perpetuation of the habitats of such species. The Board of Wildlife Commissioners, under consultation with authorities, will determine which species' existence is endangered or habitat is threatened with destruction, thereby warranting protection under this statute. This statute applies to species listed by the State of Nevada that may be affected during the implementation of the proposed Project.

3.6.2 Environmental Setting

The Project area lies in the Amargosa Valley in Nye County, Nevada, between the Yucca Mountains to the north and the Funeral Mountains to the southwest. The proposed Project is located in the Northern Mojave Desert Ecoregion which encompasses the southern tip of Nevada and extends into Arizona, California, and Utah. This ecoregion is a transitional region between the higher and cooler Great Basin Desert to the north and the warmer Sonoran Desert to the south (Webb et al. 2009), featuring basin and range topography, with broad valleys separated by rugged mountain ranges. This ecoregion is dominated by Mojave Desert scrub, which is intermediate between the Great Basin Desert scrub and the Sonoran Desert scrub habitats. Elevation in the region ranges from approximately 450 to more than 8,000 feet, averaging 2,770 feet. Precipitation in this ecoregion ranges from approximately 5 to 11 inches per year, with slightly more winter than summer precipitation.

The Amargosa Valley averages 4.2 inches of rain annually, with annual extremes of anywhere from less than half an inch (0.45 inch in 2002) to more than 10 inches (10.4 inches in 1983) (Western Regional Climate Center 2009). The Project area is characterized as creosote desert scrub, dominated by creosote bush (*Larrea tridentata*). It is a typical dry region of Mojave Desert, with relatively sparse shrub canopy and very little annual herbaceous growth except during wet years. The topography of the Project area is uniform with a few small, shallow washes that cross the site from north to south. The largest of these washes is Fortymile Wash that connects to the Amargosa River.

3.6.3 Data Collection Methods

A biological inventory of the Project area was conducted utilizing scientific literature, satellite imagery, agency contacts, and biological resource field surveys. Data were collected by Tierra Data, Inc. in the Project area in the spring and summer of 2009. Agency personnel were asked to provide information on potential or known occurrences of sensitive species of wildlife and plants and on habitats of special concern within the Project area and ROI. The following agencies were contacted for information: BLM, USFWS, and NDOW.

Data were collected and digitized into GIS format for:

- vegetation communities
- species listed as federally threatened, endangered, or as candidates under review for listing
- species classified as rare, sensitive, or otherwise protected by the State of Nevada
- areas of special biological value or interest, including riparian and wetland habitats

The report entitled Biological Resources Surveys for Amargosa Farm Road Solar Project contains detailed information on the vegetation and wildlife resources inventoried. The results of the biological resources inventory are summarized below.

3.6.4 Vegetation

3.6.4.1 Vegetation Communities within ROI and Project Area

The ROI for botanical resources, including threatened, endangered, proposed, and candidate plant species, consists of areas that may be affected by permanent and temporary features of the Proposed Action and areas that may be impacted groundwater withdrawal. The extent of the ROI for botanical resources is based on the effects on surface and groundwater hydrology discussed in the analysis provided in Water Resources-Seetion 3.4 of this document. Based on these criteria, the ROI for direct impacts on botanical resources includes those areas in the immediate vicinity of the Proposed Action construction, operation, and maintenance activities. The ROI for indirect effects is the Amargosa Desert Hydrographic Basin #230.

The majority of the Project area is characterized as desert flats with Mojave creosote scrub (Holland code 34100; Hartman 2002) as the sole dominant community type. This community type is dominated by creosote bush, either as the sole dominant or co-dominant, with one or more other shrub species. Burrobush is the most typical co-dominant, followed by saltbush (*Atriplex* spp.) in more alkaline soils. The shrubs range from 1.5 to 9 feet tall, are widely spaced, and generally the ground between shrubs is essentially barren or contains very sparse forbs and grasses (Hartman et al. 2002). Growth occurs during spring (rarely in summer or fall) if rainfall is sufficient. Cold winters and droughts in other seasons can limit plant growth. Many herbaceous ephemeral species may flower in late Mareh and April if winter rains are sufficient. Summer thundershowers can also trigger growth in these ephemeral species.

The soils where creosote scrub occurs are characterized as well-drained soils with very low available water holding capacity (Hartman 2002). They occur on slopes, alluvial fans, and valleys. Winter nighttime temperatures are often below freezing in these areas.

Creosote scrub is extensive and characteristic of the Mojave Desert, extending from the Death Valley region southward and across the Mojave Desert to the San Bernardino Mountains, and eastward to northwestern Arizona and southern Nevada (Hartman 2002).

A number of shallow ephemeral washes cross the western half of the Project area flowing from north to south; however, none have desert riparian trees typical of desert washes in more mesic

regions, such as desert willow (*Chilopsis linearis*) or catclaw acacia (*Acacia greggii*). The washes in the Project are mainly unvegetated, or have a sparse shrub assemblage composed primarily of the surrounding desert flats. A few individuals of cheesebush (*Hymonoclea salsola*), a shrub species typical of desert washes elsewhere, do occur, but are sparse and widely scattered. In some places, the washes have well-developed banks, especially Fortymile Wash. Along the banks it is more common to see desert saltbush (Atriplex polycarpa) than in the uplands away from the banks.

3.6.4.2 General Vegetation Conditions within Project Area

The vegetation within the Project area is generally very sparse and dominated by creosote bush and burrobush (*Ambrosia dumosa*), with very little herbaceous growth; most of which is confined to the shrub canopies or just a short distance beyond (Figure 3-9). Between shrubs the surface is mostly barren, desert pavement with a widely scattered growth of a few forb and grass species, primarily cryptantha (*Cryptantha* spp.), goldfields (*Lasthenia californica*), and devil's spineflower (*Chorizanthe rigida*).

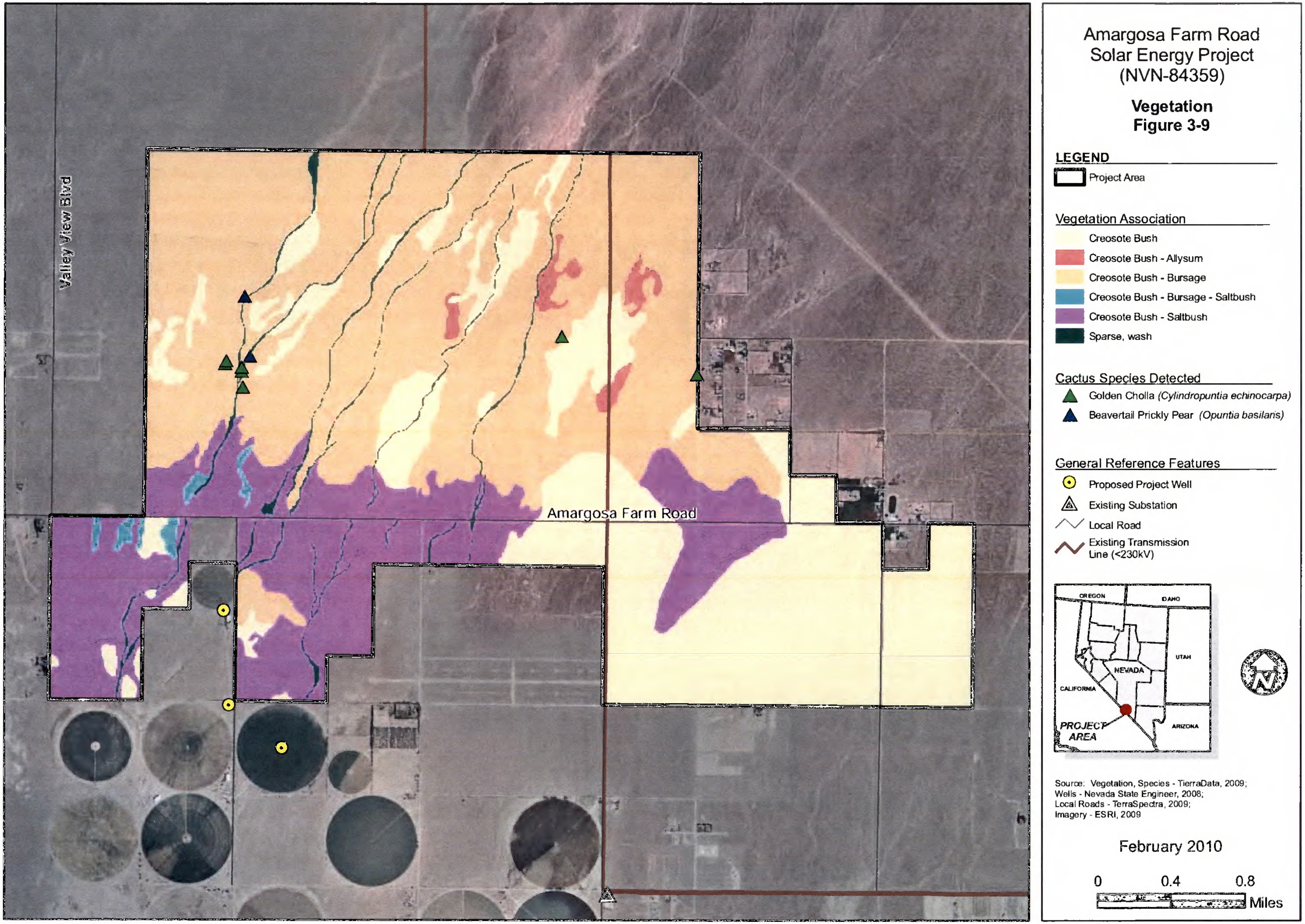
The relative proportions of these annuals tended to shift from mostly Cryptantha and Schismus in areas of creosote bush-burrobush, to more Chorizanthe in areas dominated solely by creosote bush. Other forb species common on-site were various annual buckwheat speeies (e.g., flat-topped buckwheat [*Eriogonum deflexum*], Thomas' buckwheat [*Eriogonum thomasii*]), several species of the primrose (Onagraceae) family (e.g., devil's lantern [*Oenothera deltoides*], Booth's evening primrose [*Camissonia boothii*]), and annual mustard species (none could be identified in 2009 since the only evidence observed was the remnants of previous years' growth, which lacked the identifiable structures necessary to identify the species). Other annual species documented in the species list compiled for this Project were scarce, occurring mostly as widely scattered individual plants.

Cacti found within the Project area are represented by just two species; golden cholla (*Cylindropuntia echinocarpa*) and beavertail pricklypear (*Opuntia basilaris* var. *basilaris*). Only seven cholla and two beavertail were found. All cacti, with the exception of two, were located in a small area in the northwestern quadrant of the Project site (Figure 3-9).

The washes located within the Project area are little more than shallow swales, with no riparian vegetation.

3.6.4.3 Regulated Noxious Weeds

The Nevada Department of Agriculture (NDA) maintains a list of Noxious Weeds that are regulated within the State of Nevada (NDA 2005). Surveys conducted in the spring of 2009 failed to detect any species listed by the NDA as a noxious weed.


Amargosa Farm Road
Solar Energy Project
(NVN-84359)
Vegetation
Figure 3-9
LEGEND
Project Area
Vegetation Association
Creosote Bush
Creosote Bush - Allysum
Creosote Bush - Bursage
Creosote Bush - Bursage - Saltbush
Creosote Bush - Saltbush
Sparse, wash
Cactus Species Detected
Golden Cholla (Cylindropuntia echinocarpa)
Beavertail Prickly Pear (Opuntia basilaris)
General Reference Features
Proposed Project Well
Existing Substation
Local Road
Existing Transmission Line (<230kV)
OREGON
IDAHO
UTAH
NEVADA
CALIFORNIA
ARIZONA
PROJECT AREA
Source: Vegetation, Species - TierraData, 2009;
Wells - Nevada State Engineer, 2008;
Local Roads - TerraSpectra, 2009;
Imagery - ESRI, 2009
February 2010
0 0.4 0.8
Miles
Valley View Blvd
Amargosa Farm Road

3.6.4.4 Non-native and Invasive Plants

Plant surveys conducted in spring 2009 found 8 species that are not native and may be invasive to the area (Table 3-12) (Tierra Data 2009).

Table 3-12 Non-native and Invasive Plants within the Project Area

Scientific Name	Common Name
Bromus madritensis ssp. *rubens*	red brome
Datura stramonium	jimson weed
Erodium cicutarium	redstem stork's bill
Salsola sp.	Russian thistle
Salsola tragus	spiny Russian thistle
Schismus barbatus	Mediterranean grass
Sisymbrium irio	London rocket
Tamarix aphylla	Athel tamarisk

Red brome

Red brome (*Bromus madritensis* ssp. *rubens*) is the most widely scattered non-native grass species in the area, and is one of the most invasive because, once established, it becomes competitive with other grasses. The tolerance of this subspecies to high salt and high pH conditions partially explains its success in desert soils, but control may be possible by reducing seed production and increasing competition from native herbaceous plants.

Jimson weed

Jimson weed (*Datura stramonium*) is commonly found on dry rangelands and waste places, and was found scarcely scattered in the Project area. The seeds of this plant can lie dormant underground and germinate when the soil is disturbed.

Redstem stork's bill

Redstem stork's bill (*Erodium cicutarium)*, also known as filaree, is a widespread annual species common in disturbed habitats. It has the capacity to form dense, transient populations when conditions are suitable.

Russian thistle

Russian thistle (*Salsola* sp.) is especially troublesome because it is very difficult to control once it becomes established. It is a common invader on disturbed sites and is extremely drought tolerant, the taproot extends several feet into the soil to reach subsurface moisture. The numerous seeds are spread when mature plants are blown along by the wind. A few patches of spiny

Russian thistle (S. *tragus*) were present, some of which consisted of numerous individuals and seedlings. The populations ranged from a few plants to greater than 20 plants. All individuals were located near roads, generally no more than 60 feet from the road edges. Control of Russian thistle is difficult. Biological agents were introduced in the 1970s with little success

Mediterranean grass

Mediterranean grass (*Schismus barbatus*) is common in agricultural and urban areas, occurring along roadsides, in cultivated fields, and other disturbed areas, although it can occur in undisturbed habitats as well, especially along river bottoms, plains, and hillsides in desertscrub. Activities that disturb the soil and reduce groundcover contribute to its spread. Mediterranean grass is commonly found in the spaces between shrubs, often producing a carpet of green that turns purplish at maturity and fades to a light straw color soon after death.

London rocket

London rocket (*Sisymbrium irio*) is abundant and widespread throughout North America, and appears to thrive along roadsides, waste places, and irrigated lands. It is one of the first weeds to appear in the winter, and because it is a prolific seeder, can be a troublesome invader.

Athel tamarisk

Various Tamarix species are listed as noxious weeds in Nevada; however athel tamarisk (Tamarix aphylla), which was found in the Project area, is not regarded as weedy, nor is it considered an aggressive invader. All individuals were found near roads where they were planted in several locations around residential structures in adjacent neighborhoods; however, some of the individuals growing along roadsides were located within the Project boundary.

3.6.4.5 Federally Threatened, Endangered, Proposed, and Candidate Plant Species

No federally threatened, endangered, proposed, or candidate plant species were located during surveys of the Project area. However, the USFWS identified several threatened and endangered plant species with the potential of occurring within the ROI. Table 3-13 lists these species and identifies corresponding protection status for the BLM and the State of Nevada.

All federally endangered and threatened plant species assessed in this document are endemic to the Ash Meadows NWR area. Ash Meadows NWR is home to 25 species of plants and animals found nowhere else in the world and are highly dependent upon available water (USFWS 1990). The Project area is located approximately 7 miles northwest of the edge of the Ash Meadows NWR, which is located within the ROI.

Table 3-13 Endangered and Threatened Plant Species that May Occur within the Region of Influence

Scientific Name	Common Name	Habitat	Endangered Species Act	State of Nevada	BLM
Nitrophila mohavensis	Amargosa Niterwort	Carson Slough – highly alkaline, moist, salt-encrusted soils	Endangered	Endangered	Sensitive
Astragalus phoenix	Ash Meadows Milkvetch	Ash Meadows – hard, white, alkaline clay soils	Threatened	Endangered	Sensitive
Centaurium namophilum	Spring-loving Centaury	Ash Meadows – seasonally flooded wetlands, moist alkali meadows, and edges of some scrub-shrub communities	Threatened	Endangered	Sensitive
Enceliopsis naudicaulis var. corrugata	Ash Meadows Sunray	Ash Meadows - dry washes and weathered saline soils	Threatened	Endangered	Sensitive
Grindelia fraxinopratensis	Ash Meadows Gumplant	Ash Meadows - ash-screwbean mesquite woodlands and desert shadscale scrub vegetation	Threatened	Endangered	Sensitive
Ivesia eremica	Ash Meadows Ivesia	Ash Meadows - highly alkaline, clay lowlands or depressions where soil moisture remains high	Threatened	Endangered	Sensitive
Mentzelia leucophylla	Ash Meadows Blazing Star	Ash Meadows - upland alkaline soils found in arroyos and on knolls	Threatened	Endangered	Sensitive

Amargosa Niterwort

Regulatory Status

The Amargosa niterwort (*Nitrophila mohavensis*) was first proposed endangered under the Endangered Species Act on October 13, 1983 with six other rare plants and one insect species in Ash Meadows, Nevada and California (48 FR 46590-46598). It was finally listed as Endangered with designated Critical Habitat on May 20, 1985 (50 FR 20777-20794). The plant was included in a recovery plan at Ash Meadows with 11 other federally listed species in 1990 (USFWS 1990). In addition to federal protection, it is fully protected in Nevada, is a BLM Special Status Species in Nevada, and is considered endangered by the Nevada Native Plant Society (NNHP 2001). Designated Critical Habitat is located in Inyo County, California, approximately two miles northeast of the Amargosa River along Ash Meadows Road, approximately 0.75 miles south of the California-Nevada state line (USFWS 1990).

Species Description

The Amargosa niterwort was first collected by J.C. and A.R. Roos in 1955 (50 FR 20777-20794) and described by Munz and J.C. Roos in 1955 (48 FR 46590-46598; 50 FR 20777-20794). This small, four inch tall perennial herbaceous plant is a member of the goosefoot family, that is comprised of a group of herbs or shrubs that are often succulent or seurfy, often weedy and frequently of saline or subsaline places (Munz 1974). The characteristie which identifies *Nitrophila* from other genera is the presence of sepals, that are strongly imbricate, scarcely united, and strongly chartaceous. The leaves are opposite and united at the base (Munz 1974). The Amargosa niterwort is one of two species included in the *Nitrophila* genus, and is identified by its 5-8 centimeter (cm) stems that are erect from extensive heavy underground root-stocks, round-ovate leaves, small, inconspicuous pink flowers and shiny black seeds (Munz 1974). *N. mohavensis* appears to be restricted to heavy alkaline mud in habitats at approximately 2,050 feet in elevation.

Status and Distribution

The Amargosa niterwort occurs in colonies of individuals linked by their large, rhizomatous roots in highly alkaline, moist, salt-encrusted clay soils within the southern portion of Carson Slough in Nevada and California. Carson Slough is a large and extensive marsh into which the waters from Fairbanks Spring drain, but has been obliterated due to the present large-scale exploitation of water resources for agricultural purposes. Only a few remnants of the marshland and its vegetation are known to exist today. The Carson Slough was not botanically surveyed prior to its destruction and there is no basis upon which to judge how many rare or possibly endemic species may have been lost (CMI 1996).

When the species was listed in 1985, it was known from one location, the type locality, in the southern end of Carson Slough, approximately three miles northeast of Death Valley Junction, California (Beatley 1977; USFWS 2007a). Since the listing in 1985, five additional populations have been documented, totaling six populations; two in California and four in Nevada. In Nevada, populations were found at Crystal Reservoir, Central Carson Slough 1 on the NWR boundary line, Central Carson Slough 2 outside of the NWR, and the NWR West Entranee, north and south side of Spring Meadows Road. During surveys condueted by USFWS and USGS in 2005 and 2006, the species was found at five of the six known locations. During surveys conducted at the NWR West Entrance in 2006 resulted in no plants found. Currently, this population is likely extirpated from the location (USFWS 2007a). The most important *Nitrophila mohavensis* population is located in the Lower Carson Slough in California, but the Crystal Reservoir population in Nevada represents the second most important population for the species. According to USFWS (2007a), the size and extent of the Crystal Reservoir population is not well characterized, but it appears to be the second most important population with respect to the number of ramets observed. Ramets are the above-ground stems, that are the most visible to the naked eye, but they may not represent true numbers of plants because they reproduce underground as rhizomes, along which multiple ramets emerge.

The population at Crystal Reservoir occupies larger acreage than at Lower Carson Slough, but the population is smaller and less dense. In a 2005 survey conducted by Caicco (2005), the niterwort occupied approximately 25-30 acres. The remaining populations of niterwort in

Nevada and California represent approximately two percent of the known distribution of ramets (USFWS 2007a). Based on available data, according to USFWS, the Lower Carson Slough population may be declining due to the species' inability to recover from impacts resulting from development activities (e.g. peat mining, water diversions, and groundwater pumping associated with large-seale farming in the NWR and Upper Carson Slough during the 1950s and 1960s). It also appears the extent of the Lower Carson Slough and Tecopa populations are also decreasing. According to USFWS (2007a), little or no data are available to suggest trends for the populations at Tecopa and the NWR West Entrance.

Life History

There is little known about the life history of Amargosa niterwort, but it is known to be a long-lived perennial, reproducing underground. Its presence appears to be limited to areas that are highly alkaline in moist salt-encrusted clay soils. Observations indicate it is an extremely hardy plant that is tolerant of high soil salinity and alkalinity, and because of this, few other plant species occupy the habitat where it grows (USFWS 1990). Large rhizomatous roots connect many seemingly individual plants within a colony. Flowering occurs in late spring (NNHP 2001). Elevations documented for the species occur between 2,100 and 2,160 feet above mean sea level (amsl).

The niterwort is confined to specific habitat that is restricted to extremely loeal areas within or near the Carson Slough, where saline and alkaline sinks occur near the terminuses of seepage from springs that lie many miles to the north and east in Ash Meadows (50 FR 20777-20794).

Ash Meadows is a fragile ecosystem dependent on water, which enters a vast underground aquifer system. The water is known as fossil water because it takes thousands of years to move through the ground. The fault system blocks the flow of water, forcing it to the surface into 30 seeps and springs (Desert Gazette 2009). The hydrological and soil conditions at these sites make them uniquely suitable for Amargosa niterwort. Little is known regarding the subsurface flows in the Central and Lower Carson Slough that currently support the majority of the niterwort. A groundwater study conducted by Rowley in 2003, determined that groundwater entering Lower Carson Slough comes from three or four flow paths within the Death Valley Flow system that includes Ash Meadows subbasin and/or Alkali Flat Furnace Creek Ranch subbasin (Rowley 2003).

Threats to the Species

A significant portion of plant habitat in Ash Meadows was eliminated in the 1960s when Carson Slough was drained to facilitate peat mining, then large scale farming shortly thereafter. Even though Amargosa niterwort habitat was not plowed, free-flowing water to its habitat was halted by upstream plowing and reduction of spring flows resulting from groundwater pumping (48 FR 46590-46598). According to Reveal (1978), Amargosa niterwort is sensitive to disturbance and does not reestablish itself at sites where salt crust overlying the soil has been disturbed. The Nevada population lies in a remote area where the disturbance has been limited to trampling by wild horses and soil compaction by off-road vehicles (USFWS 1990).

Throughout the species' range, three major threats have been identified by USFWS (2007a): (1) Ecosystem-based alteration, particularly habitat loss by changes in groundwater availability, (2) direct and indirect impacts resulting from surface mining, and (3) direct and indirect impacts resulting from raised construction of Ash Meadows Road. Currently, three of the four Nevada population sites face the threat of interruption of water supply to habitat. The fourth site at Crystal Reservoir, appears to be secure from the threat. Impacts to the niterwort due to groundwater pumping may not be immediately evident. Slow population declines can take years and trends may be masked by other factors such as annual variations in precipitation (USFWS 2007a). The Project area is located approximately 7 miles northwest of the Ash Meadows NWR within the adjacent Alkali Flat/Furnace Creek hydrologic subbasin; however, none of the Nevada population sites are within this subbasin (USFWS 2007a). Given the proximity and predicted flow paths, the Central and Lower Carson Slough populations of Amargosa niterwort likely receive water from both the Ash Meadows and Alkali Flat hydrologic subbasins (USGS 2002). The hydrology that supports the Crystal Reservoir population is poorly understood because at the time the Reservoir was constructed in 1970s, it was unknown whether the niterwort already existed there (USFWS 2007a).

The second major threat to all Ash Meadows species, including Amargosa niterwort, is habitat loss or degradation from surface mining. Mining directly and indirectly threatened the Lower Carson Slough population in California, and the four niterwort populations on the Ash Meadows NWR, which are on BLM and USFWS lands with public minerals. The third threat is from habitat degradation from construction of Ash Meadows Road. In the late 1999 and early 2000, the California Department of Transportation (CalTrans) improved Ash Meadows Road where it crossed the Lower Carson Slough and Amargosa niterwort habitat. CalTrans raised the roadbed, which altered sedimentation patterns in the Carson Slough during thunderstorms or rare high flow events (USFWS 2007a). Other threats to the niterwort include trampling by wild horses and off-highway vehicle (OHV) activity, invasive species and fire, and damage to Crystal Spring Dam.

Species in the Project Area

The Project area is located approximately 12 miles northwest of the nearest known locations of the species in near Crystal Reservoir at Ash Meadows NWR. The plant has never been found within the Project area, although the plant populations at Ash Meadows share some groundwater-related commonalities with the Project. The Ash Meadows Basin (includes most of Ash Meadows NWR) and Alkali Flat-Furnace Creek Basin (includes the Project and a small portion of Ash Meadows NWR) are connected by the Central Death Valley subregion of the Death Valley regional groundwater flow system.

Ash Meadows Blazing Star

Regulatory Status

The Ash Meadows blazing star (*Mentzelia leucophylla*) was listed as threatened with designated Critical Habitat on May 20, 1985 (50 FR 20777-20794). The plant was included in a recovery plan at Ash Meadows with 11 other federally listed species in 1990 (USFWS 1990). In addition

to federal protection, it is fully protected in Nevada, is a BLM Special Status Species in Nevada, and is considered threatened by the Nevada Native Plant Society (NNHP 2001). Critical Habitat consists of 1,240 acres in Ash Meadows at four locations; two along and just east of Carson Slough and two east of Carson Slough in close proximity to Devils Hole (50 FR 20777-20794).

Species Description

The Ash Meadows blazing star (*Mentzelia leucophylla*) was first collected in 1898 by Carl Purpus, and described by Brandegree in 1899 (USFWS 1990). Initially, the plant collected by Purpus was included with *M. oreophila* as a single species by Darlington in 1934 and Abrams in 1951. The reverse synonymy was published by Jepson in 1936 and Munz and Keck in 1959. Taxonomy of the species was in question until the issue was resolved in a status report completed by Reveal in 1977.

This small biennial or short-lived perennial is a member of the stick-leaf (blazing star) family that is comprised of a group of herbs that are pubescent with barbed or sometimes stinging hairs. The characteristics which most readily identifies *Mentzelia* from other genera is the presence of three placentae, seeds that are 1-4 millimeters (mm), white to golden yellow flowers, and never with stinging hairs (Munz 1974). *M. leucophylla* has leaves that are densely covered with white hairs (NNHP 2001). Flowers are few, small, opening only briefly from June to September. In addition, the stems are covered with an epidermis that peels in long segments. Leaves are mainly basal, linear-oblong, 6-8 cm long, 1 cm wide, rigid, densely tomentose with strongly revolute margins. The seeds are flat and narrowly margined (Knight and Clemmer 1987).

Status and Distribution

The Ash Meadows blazing star occurs exclusively in Nye County, and is endemic to Ash Meadows. The local distribution of small populations suggests the species is extremely vulnerable to any land disturbance (USFWS 1990). It has been suggested that past development for agriculture is believed to have eliminated some populations within their range (Reveal 1978). Few individuals occur at any one site, with fewer than 200 individuals estimated on the refuge; however, because the species blends in well with the landscape, plants may be missed during surveys. Currently, four populations occur in Nevada, all of which are within designated Critical Habitat. They include (1) Purgatory Spring, (2) Old Rooker Ranch-Cold Spring, (3) North County Road, and (4) Marsh to Bradford springs (Knight and Clemmer 1987).

Life History

Mentzelia leucophylla is a small biennial or short-lived plant that occurs only in Ash Meadows, in clay soils of spring areas, especially along canyon washes where *Atriplex* is common, at elevations ranging from 2,200-2,300 feet amsl (Beatley 1976). Mozingo and Williams (1980) suggests, in addition to clay soils, it also occurs in sandy or saline clay soils in plant communities dominated by, *Atriplex confertifolia*, *Haplopappus acradenius*, *Cryptantha confertiflora*, *Enceliopsis nudicaulis* var. *corrugata*, and *Astragalus phoenix*, at elevations 2,200-6,500 feet above mean sea level. The USFWS suggests that the species is associated with upland alkaline soils found in arroyos and on knolls only within the more xeric portions of Ash Meadows (50 FR

20777-20794). However, this uncommon plant is often found with Ash Meadows milkvetch and Ash Meadows sunray According to USFWS (1990), the Ash Meadows blazing star is probably the rarest of all plant species endemic to Ash Meadows. Although little is known about its life history or habitat requirements, it is known to occupy alkaline soils in dry washes and on barren bluffs distributed along the eastern edge of Ash Meadows. Bright yellow flowers bloom from late May into September and are open only for brief periods in late afternoon (NNHP 2001).

Threats to the Species

According to USFWS (50 FR 20777-20794):

> "Existing populations have been greatly reduced from those known to have occurred 15 years ago by habitat disturbance during road construction, cropland development, and peat mining in Carson Slough. Threats to its existence include alteration of storm drainage patterns through arroyos by road construction, habitat destruction in loeations where road construction activities are proposed, and the trampling by wild and free-roaming horses".

The blazing star is narrowly confined to a spring-fed desert wetland area with extreme saline soils. Eight sites are known in Nevada, which are threatened by development. Agricultural development and the associated large-scale exploitation of the region's water resources have destroyed large portions of the local native flora (NatureServe 2009).

The local distribution of small populations suggests the species is vulnerable to any level of disturbance. In addition to trampling by wild and free-roaming horses and agricultural development, USFWS (1990) also suggests trampling by other livestock and disturbance caused by off-road vehicle travel as major threats to these small, fragile populations.

Species in the Project Area

The Project area is located approximately 9 miles northwest of the nearest known locations of the species in Nevada at Ash Meadows and Carson Slough. The plant has never been found within the Project area, although the plant populations at Ash Meadows share some groundwater-related commonalities with the Project. The Ash Meadows Basin (includes most of Ash Meadows NWR) and Alkali Flat-Furnace Creek Basin (includes the Project and a small portion of Ash Meadows NWR) are connected by the Central Death Valley subregion of the Death Valley regional groundwater flow system.

Ash Meadows Gumplant

Regulatory Status

The Ash Meadows gumplant (*Grindelia fraxino-pratensis*) was listed as threatened with designated 1,968 acres of designated Critical Habitat for the species under the Endangered Species Act on May 20, 1985 (50 FR 20777-20794). The plant was included in a recovery plan at Ash Meadows with 11 other federally listed species in 1990 (USFWS 1990). In addition to

federal protection, it is fully protected in Nevada, is a BLM Special Status Species in Nevada, and is considered endangered by the Nevada Native Plant Society (NNHP 2001). Designated Critical Habitat is located in Inyo County, California and Nye County, Nevada, at 11 locations east of Carson Slough, and one site on the west side of the Slough (USFWS 1990).

Species Description

The Ash Meadows gumplant was first collected in 1965 by Beatley, and described by Reveal and Beatley in 1971 (50 FR 20777-20794). This tall (28-40 inches) biennial (or short-lived perennial) herbaceous plant is a member of the sunflower family, the largest family of vascular plants, with possible 950 genera and 20,000 species, chiefly herbaceous, and world-wide in distribution (Munz 1974). There are one to three stems arising from a woody root-stock. The stems are glabrous, leafy, and openly branched in their upper halves. The leaves are leathery, dark green, and dotted with resinous glands. Basal leaves are oblanceolate and 4 to 7 cm long while the stem leaves are oblanceolate to oblong and 1.5 to 5.0 cm long. The leaf edge is entire to somewhat toothed at the apex (Mozingo and Williams 1980).

Status and Distribution

The Ash Meadows gumplant is endemic to the Ash Meadows area in Nye County, Nevada and Inyo County, California, and is concentrated in three main populations and several smaller ones, covering approximately 2,260 acres (BLM and USFWS 2000a), mostly within the boundaries of the Ash Meadows NWR, but one population occurs outside the wildlife refuge, but within the Ash Meadows ACEC managed by BLM. This large population extends approximately one mile into Inyo, California. Most of the populations were surveyed in 1998, and plants were confirmed at all sites identified in 1985; however a few small populations on private lands were not surveyed and six new sites were discovered during the 1998 surveys (Glenne 1998; Alexander 1998). Based on survey history, it appears the gumplant has increased its distribution since the species was listed in 1985, probably due to the conversion of some agricultural lands back to a natural state, and the species ability to recover in disturbed habitats (USFWS 2007b; Mozingo and Williams 1980).

According to USFWS (2007b), there is little quantitative or demographic data to describe trends for the Ash Meadows gumplant. In 2000, the entire population, based on visual estimates of 81,000 plants, was likely a serious underestimate of the total number of plants actually present. A 2002 survey conducted in California found approximately 241,514 (+ or – 69,660) plants on 88 acres.

Life History

The Ash Meadows gumplant is a biennial or short-lived perennial that occurs generally in moist saltgrass flats and near stringer washes and pools with high water table, at elevations ranging from 2,070 to 2,320 feet amsl (CBD 2009). It has been associated with ash-screwbean mesquite woodlands and desert shadscale scrub vegetation. It occasionally occurs on open alkali clay soils in drier shadscale habitats (BLM 2009a). According to the Nevada Natural Heritage program (NNHP) (2001), the gumplant occurs in open, flat, whitish, strongly alkaline, moist and hard to

sometimes dry and powdery clay soils in or bordering meadows and shallow drainages near springs and seeps. It sometimes occurs in disturbed and somewhat weedy areas in creosote bush-bursage and shadscale zones in ash-mesquite woodlands, shadscale scrub, or saltgrass meadows with *Prosopis* spp., *Fraxinus* spp., *Atriplex confertifolia*, *Centaurium namophilum*, *Distichlis spicata*, *Sporobolus airoides*, *Baccharis emoryi*, *Iva acerosa*, *Tamarix ramosissima*, and *Cirsium mohavense*. Best population development is on moist intact soils (Knight and Clemmer 1987). The meadow ecosystem occupied by Ash Meadows gumplant is also commonly associated with spring-loving centaury (*Centaurium namophilum*), yerba mansa (*Anemopsis californica*), western niterwort (*Nitrophila occidentalis*), and California loosestrife (*Lythrum californicum*). Additional species associated with the gumplant in shadscale scrub include desert isocoma (*Isocoma acradenius*), alkali rabbitbrush (*Chrysothamnus albidus*), and sealight (*Saueda* spp.) (Cochrane 1981).

New leaves of the gumplant start growing in June or July, and budding occurs from July through August. Beginning in June, the plant produces daisy-like bright yellow flowers, with fruit produced in early October. The seeds are very light and can be blown by the wind for a long distance. Seeds that fall near the parent plant may also be transported by water during winter rains or summer flash floods. Mammals, birds, and ants may also aid in seed dispersal. The germination date of seeds is unknown (CBD 2009).

Threats to the Species

Throughout the species' range, three major threats have been identified by USFWS (2007b): (1) Loss of habitat from groundwater pumping; (2) invasive non-native species; and (3) surface mining. During the 1985 final rule to list the Ash Meadows gumplant, interruption of water supply was identified as a major threat to the species. This threat continues today as groundwater pumping occurs on a regional scale, particularly from the Alkali Flat/Furnace Creek Ranch hydrologic basin in Amargosa Valley, at approximately two times the rate predicted to be sustainable (USGS 2005). The National Park Service indicated that the number of water rights issued by the State of Nevada for Amargosa Valley has grossly exceeded sustainable levels and the resource is over-allocated (Baldino 2006).

The second largest threat to the Ash Meadows gumplant, and all native flora, is the infestation and establishment of non- native species. According to Pimental et al. (2005), approximately 42 percent of all threatened and endangered species in the U.S. are at risk because of non-native species. Because agricultural land is common throughout the area, noxious weeds commonly associated with agriculture include Russian knapweed (*Acroptilon repens*), five hook bassia (*Bassia hyssopifolia*), Malta star thistle (*Centaurea melitensis*), yellow star thistle (*Centaurea solstitialis*), and hoary cress (*Cardaria draba*) (USFWS 2006a). The weeds directly compete with native species for water, nutrients, and sunlight, and alter ecosystem processes such as nutrient cycling and fire regime. The adaptations of noxious weeds present on the Ash Meadows Wildlife Refuge allow them to out-complete native flora and colonize undisturbed habitat (USFWS 2007b). The wet meadows are particularly vulnerable to invasion by noxious weeds because it provides favorable conditions to invade sites that are occupied by the gumplant. The agricultural fields adjacent to large populations of Ash Meadows gumplant are infested with Russian knapweed, bassia, and Malta star thistle (USFWS 2007b).

Fire facilitated by non-native species is a threat that was not identified in the 1985 listing document. Where weeds are present, anecdotal observations suggest fire appears to provide an opportunity for non-native plants to expand on the wildlife refuge where most of the gumplant exists. Because weeds alter fire regimes by increasing the ease with which fires spread through riparian corridors and along spring channels, they destroy native plants and their habitats. The hardier non-natives typically prevent regrowth and colonization of native plants after fires, causing reduction in native plant cover and diversity (USFWS 2007b).

Surface mining has remained a threat to the Ash Meadows gumplant since it was listed in 1985. Direct impacts to the plant as result of mining include loss of habitat. Indirect impacts are caused by diverting or draining water away from its habitat during mining operations (USFWS 2007b). However, there are plans to withdraw BLM and USFWS lands with public minerals, so the threat caused by surface mining is looking more optimistic for the species. Other threats to the gumplant include trampling by cattle and wild horses, OHV activity, and potential stochastic and natural catastrophic events (USFWS 2007b).

Species in the Project Area

The Project area is located approximately 11 miles northwest of nearest known locations of the species within or adjacent to the Ash Meadows National Wildlife Refuge. The plant has never been found within the Project area, although the plant populations at Ash Meadows share some groundwater-related commonalities with the Project. The Ash Meadows Basin (includes most of Ash Meadows NWR) and Alkali Flat-Furnace Creek Basin (includes the Project and a small portion of Ash Meadows NWR) are connected by the Central Death Valley subregion of the Death Valley regional groundwater flow system.

Ash Meadows Ivesia

Regulatory Status

The Ash Meadows ivesia (*Ivesia eremica*[*=I. kingii var. eremica*]) was listed as threatened with designated Critical Habitat under the Endangered Species Act on May 20, 1985 (50 FR 20777-20794). The plant was included in a recovery plan at Ash Meadows with 11 other federally listed species in 1990 (USFWS 1990). In addition to federal protection, it is fully protected in Nevada, is a BLM Special Status Species in Nevada, and is considered threatened by the Nevada Native Plant Society (NNHP 2001). Designated Critical Habitat is located at five general locations east of Carson Slough (large and extensive marsh) in Nye County, Nevada (50 FR 20777-20794).

Species Description

The Ash Meadows ivesia (*Ivesia eremica[=I. kingii var. eremica]*) was first discovered by Coville and Funston on March 2, 1891 near Watkins Ranch, south of Devils Hole in north Ash Meadows, Nye County, Nevada (Beatley 1976; Knight and Clemmer 1987). It was originally described as *Potentilla eremica* in 1892, because remains of spent flowers were collected in mid-

winter and was thought to be *P. santolinoides*, but was later changed to *Ivesia eremica.* Coville and Funston found *Ivesia* only in one location east of Watkins/Collins Ranch in an alkaline limestone marsh with *Spartina gracilis*, *Anemopsis californica*, and *Schoenus nigricans* (Beatley 1977). As of 1987, the taxonomy of the species and genus has been controversial. The *Horckelia-Ivesia-Potentialla* complex went through revision, and *Ivesia eremica* became the accepted name of the plant, although some botanists question whether this taxon is distinctive enough to be maintained as a discrete variety of the species *I. kingii.* The species as a whole is extremely variable and somewhat rare (NNHP 2001).

This tall, prostrate perennial herb is a member of the rose family. It grows from an erect thick woody root that bears a basal tuft of grayish pubescent leaves. The leaves are pinnately compound with 60 pairs of imbricate leaflets covered by an appressed-hirsute tomentum. (Knight and Clemmer 1987). Flowering stems are about 9 cm long and bear white flowers from August to October (NNHP 2001). Plants occur as solitary clumps not exceeding 1.9 inches high and 9.75 inches in diameter (USFWS 1990).

Status and Distribution

As of 1987, seven populations were located in Ash Meadows. They included: (1) Old Rooker Ranch; (2) Shaft-Chalk springs; (3) Mary Scott-Indian-School-Crystal Pool springs; (4) Crystal Pool/Amargosa Reservoir; (5) Collins Ranch; (6) Bluffs west of County Road; and (7) Tubbs-Love ranches (Knight and Clemmer 1987). According to USFWS (1985), existing populations were smaller and less numerous than those known historically because of habitat eliminations during agricultural development From 1987 through 2001, eight occurrences were mapped totaling 3,862 plants covering approximately 9.1+ acres (NNHP 2001), but are now more widely distributed.

Life History

There is little known about the life history of Ash Meadows ivesia, but it is known as a matted perennial herb that flowers from September to October. All other stages including germination, leafing, budding, fruiting and fruit dispersal and dissemination agents are unknown (CMI 1996).

Ash Meadows ivesia is associated with highly alkaline, clay lowlands or depressions where soil moisture remains high from perched groundwater maintained by springs and seeps (50 FR 20777-20794). It occurs only in the mesic, meadow areas of just north and east of Ash Meadows at elevations ranging from 2,200- 2,300 feet amsl (CMI 1996). The flat, mesic, meadow areas with white, alkaline clay soils are remnants of Pleistocene age lakes. The ivesia is associated with *Distichlis spicata* var. *stricta*, *Centaurium namophilum*, *Haplopappus acradenius*, *Spartina gracilis*, *Juncus balticus*, and *Cordylanthus tecopensis* (Knight and Clemmer 1987). According to NNHP (2001), Ash Meadows ivesia occurs in open, moist to saturated, whitish, heavy, to chalky soils on flats, drainages, and bluffs near springs and seeps, in saltgrass meadow, shadscale, and ash-mesquite vegetation with *Atriplex confertifolia*, *Prosopis* spp, *Cirsium mohavense*, *Fraxinus velutina*, *Anemopsis californica*, and *Iva acerosa*.

Threats to the Species

Threats to the Ash Meadows ivesia include trampling by cattle, wild horses, and sheep, and spring diversions and groundwater pumping resulting in the drying of soils and elimination of its habitat (USFWS 1990). The existing populations are smaller and less numerous than those known historically because of habitat eliminations during agricultural development, including cropland development, spring alteration, and stream channelization and diversion, and during road construction occurring with municipal development (50 FR 20777-20794).

Groundwater depletion, drying ivesia habitat, poses the greatest threat to the existence of the species. Its dependence on perched groundwater issuing from seeps and springs or their outflows makes it extremely vulnerable to decreases in spring discharge that result in less water seeping to areas distantly removed from water sources (50 FR 20777-20794). In addition, road construction could eliminate populations by passing through habitat or interrupting drainage patterns and drying areas that were previously moist. Approximately 45 percent of the known populations occur on the Ash Meadows NWR.

Species in the Project Area

The Project area is located approximately 9 miles northwest of the nearest known locations of the species in Nevada at Ash Meadows and Carson Slough. The plant has never been found within the Project area, although the plant populations at Ash Meadows share some groundwater-related commonalities with the Project. The Ash Meadows Basin (includes most of Ash Meadows NWR) and Alkali Flat-Furnace Creek Basin (includes the Project and a small portion of Ash Meadows NWR) are conneeted by the Central Death Valley subregion of the Death Valley regional groundwater flow system.

Ash Meadows Milkvetch

Regulatory Status

The Ash Meadows milkvetch (*Astragalus phoenix*) was proposed threatened under the Endangered Species Act on October 13, 1983 with six other rare plants and one insect species in Ash Meadows, Nevada and California (48 FR 46590-46598), and finally listed as threatened with designated Critical Habitat on May 20, 1985 (50 FR 20777-20794). The plant was included in a recovery plan at Ash Meadows with 11 other federally listed species in 1990 (USFWS 1990). In addition to federal protection, it is fully protected in Nevada, is a BLM Special Status Species in Nevada, and is considered threatened by the Nevada Native Plant Society (NNHP 2001). Designated Critical habitat includes nine small areas east of Carson Slough at Ash meadows in Nye County, Nevada. This designation includes 1,200 acres of dry, hard, white, barren saline, clay flats, knolls, and slopes, which is the only suitable habitat for the plant (USFWS 2009a).

Species Description

The Ash Meadows milkvetch was first collected in Ash Meadows by Carl Anton Purpus in 1898. His original specimen was left unnamed until botanist Art Cronquist (1972) collected and named a second better specimen in 1966. It was finally described by Rupert Barneby in 1970 (Barneby 1970). This low, mat-forming perennial herb is a member of the legume or pea family, which is comprised of 450-500 genera and many thousands of species, many of great economic importance for food, forage, dyes, and wood (Munz 1974).

The plant forms mounds that are up to 40-50 cm across. The older stems characteristically have a flaking bark. The leaves, which are densely covered with coarse, white hairs, are 1.5 to 3.5 cm long and bear 2 to 3 ovate to obovate leaflets which are 3 to 7 mm long. The stipules are 2 to 3 mm long, pubescent on the outer surface and glabrous on the inner surface. The pinkish to purple flowers are borne on short, erect stems in a mat and commonly number only one or two per inflorescence. No other species occurs within the known range of *Astragalus phoenix* with which it could easily be confused. The flowers are very similar to those of *A. newberryi* Gray, but the latter is vegetatively very different in that it does not form the dense mound of foliage typical of *A. phoenix* (Mozingo and Williams 1980).

Status and Distribution

The Ash Meadows milkvetch is endemic to the Ash Meadows area in Nye County. Its range includes the Ash Meadows NWR, a small portion of the BLM Ash Meadows ACEC adjacent to the northeastern refuge boundary, and private lands within the refuge boundary. The plant was originally known from six sites in spring areas of north and east Ash Meadows (Beatley 1976). Two years later, Reveal (1978) estimated the population to contain 1,000 individuals. Cochrane (1981) identified 19 localities at which the milkvetch had been reported. Knight and Clemmer (1987) reported the species at six sites, which represented subpopulations of one historically larger, biological unit growing as adaphic endemics. In 1998, survey efforts concentrated on the six sites identified by Knight and Clemmer in 1987, and the total population was estimated to be about 1,800 plants on 847 acres (BLM and USFWS 2000b.).

Refuge-wide surveys of listed and rare plants, including, Ash Meadows milkvetch, were begun in 2008. As a result of these surveys, the total population on the wildlife refuge is estimated at 11,643 individuals on about 800 acres (Bio-West 2008a). According to Bio-West (2008a), a large area on public land occupied by the milkvetch was newly discovered adjacent to a previously known population on private land in 2008. The occupied area at most other previously reported sites was also extended.

Life History

The life history and habitat requirements of Ash Meadows milkvetch are largely unknown (USFWS 1990), but appear to be consistent with a stress-tolerant life history as described by Grime (1977). It is known to be a long-lived perennial composed of spreading branches that eventually form large, pulvinate mounds. Both foliage and fruit are matted with dense, grayish hairs. The plants accumulate air-borne particles, becoming partially buried by maturity (Knight and Clemmer 1987).

Stress-tolerant plants are typically long-lived with low annual production, except during favorable conditions (Grime 1977). According to Reveal (1978), winter and early spring rains are required to produce large numbers of flowers, but some flowering occurs each year regardless of climatic conditions. Flowering occurs in early spring from March to late May with fruit forming in April and lasting to June-July. It appears that population growth is constrained by low seed output per plant when precipitation is low. The opposite is generally true when there is above average precipitation. However, in a study conducted by Pavlik et al. (2006), seedlings were not observed at four of the six known sites during a year with above average precipitation. It was suggested that either the seed bank was depleted or the species was dependent on the most extreme and infrequent precipitation events. Wind and water appear to be the primary vectors for dispersal of seeds, and these seeds typically remain within the leaves and branches of the parent plant (USFWS 2009b).

Stress-tolerant species, like Ash Meadows milkvetch are generally slow to recover from disturbance, and given the little known life history of the plant and its naturally low rate of reproduction, it is unlikely that severely disturbed habitat has recovered. However, the slow population increases are probably the result of new protections implemented at Ash Meadows since it was established as a wildlife refuge (USFWS 2009c).

The Ash Meadows milkvetch grows between 2,200 and 2,300 feet elevation amsl, and appears to be restricted to flats and knolls of hard, white, alkaline clay soils in the Ash Meadows area (Knight and Clemmer 1987). The specific hydrological requirements for the species are largely unknown, but surface and subsurface groundwater that reaches the surface through capillary action may be an important habitat determinant for at least some of the populations of the species. The primary constituent elements of designated critical habitat consist of the biological and physical attributes essential to the species' conservation within those areas (USFWS 2009c). Those elements include hard, white, barren, saline, clay flats, knolls, and slopes (USFWS 2009c). Plant species associated with the Ash Meadows milkvetch include, saltgrass, shadscale, Ash Meadows blazing star, Alkali golden bush (*Isocoma acradenius*), and Ash Meadows sunray (*Enceliopsis nudicaulis* var. *corrugata*) (Knight and Clemmer 1987).

Threats to the Species

The threats to Ash Meadows milkvetch are consistent with those of other Ash Meadows plants and ecosystem including: (1) Present and threatened destruction, modification, or curtailment of habitat or range (e.g. groundwater withdrawal, surface mining, proposed road construction); (2) inadequacy of existing regulatory mechanisms; (3) other natural or manmade factors affecting continued existence (e.g. trampling by wild horses) ; (4) non-native species; (5) rabbit herbivory of flowers and fruits; (6) off-highway vehicles; (7) stochastic events affecting species with restricted ranges or small population sizes; and (8) climate change (USFWS 2009c).

At the time of listing, groundwater development was a major threat to the milkvetch and the entire Ash Meadows ecosystem. The milkvetch depends, in part, on near-surface water for its survival. Water levels in Devils Hole stabilized after groundwater pumping on the refuge stopped in 1975; however, the water level in Devils Hole declined 7 cm between 1988 and 2004, and increased again after a wet year. As groundwater pumping at Ash Meadows decreased, it

increased in the Amargosa Valley, and is currently occurring in some areas of the basin at about twice the rate predicted to be sustainable (USGS 2005).

Habitat loss or degradation from surface mining occurs in the Ash Meadows area. New mineral claims and subsequent mining could cause direct loss of Ash Meadows milkvetch habitat, as well as indirect impacts by diverting or draining water away from occupied habitat. Surface mining of a valid existing mining claim on private land within the wildlife refuge, therefore, poses a significant threat to one of the six known populations of Ash Meadows milkvetch. Alteration of the local groundwater table because mining could negatively affect this population and adversely modify its critical habitat on adjacent public land (USFWS 2009c).

New proposed road construction is not a threat to the milkvetch; however, some populations along the Ash Meadows Road may have been affected by the disruption of surface flows due to prior road construction. The species is found on the floor of washes and water has been identified as one of the vectors by which its seed may be distributed (Reveal 1978).

Non-native species impact approximately 42 percent of all federally listed and rare plants in the U.S. (Pimental et al. 2005). They compete directly with native species for water, nutrients, and sunlight, and indirectly by altering ecosystem processes such as nutrient cycling and fire regimes (Brooks et al. 2004). The flats and knolls of hard, dry, alkaline clay that support the Ash Meadows milkvetch is a harsh environment, so weeds have not been identified as a major threat to the species. However, salt cedar (*Tamarix ramosissima*), Russian knapweed, five hook bassia (*Bassia hyssopifolia*), Malta star thistle, yellow star thistle, and hoary cress are noxious weeds that could potentially threaten Ash Meadows milkvetch (USFWS 2006b).

Species in the Project Area

The Project area is located approximately 9 miles northwest of the nearest known locations of the species in Nevada at Ash Meadows and Carson Slough. The plant has never been found within the Project area, although the plant populations at Ash Meadows share some groundwater-related commonalities with the Project. The Ash Meadows Basin (includes most of Ash Meadows NWR) and Alkali Flat-Furnace Creek Basin (includes the Project and a small portion of Ash Meadows NWR) are connected by the Central Death Valley subregion of the Death Valley regional groundwater flow system.

Ash Meadows Sunray

Regulatory Status

The Ash Meadows sunray (*Enceliopsis nudicaulis* var. *corrugata*) was first proposed as threatened under the Endangered Species Act on October 13, 1983 with six other rare plants and one insect species in Ash Meadows, Nevada and California (48 FR 46590-46598), and was listed as threatened with designated Critical Habitat on May 20, 1985 (50 FR 20777-20794). The plant was included in a recovery plan at Ash Meadows with 11 other federally listed species in 1990 (USFWS 1990). In addition to federal protection, it is fully protected in Nevada, is a BLM Special Status Species in Nevada, and is considered threatened by the Nevada Native Plant

Society (NNHP 2001). Approximately 1,760 acres of Designated Critical Habitat are located in the Ash Meadows area in Nye County, Nevada, approximately 7 miles southeast of the Project (USFWS 1990). It includes nine locations, comprised of three main subpopulations, along and east of Carson Slough and in the vicinity of Devils Hole. Some of this area overlaps with Critical Habitats for the Ash Meadows milkvetch and Ash Meadows blazing star (USFWS 1990).

Species Description

Ash Meadows sunray was described in 1972 from specimens collected by Cronquist in 1966 in north Ash Meadows (Cronquist 1972; Beatley 1976). This medium-sized perennial shrub is a member of the sunflower family, the largest family of vascular plants, with a possible 950 genera and 20,000 species, chiefly herbaceous, and world-wide in distribution (Munz 1974). It forms clumps 4 to 16 inches high from a stout, woody root-stock. The leaves, which are densely tomentose with fine grayish-white hairs, are relatively small, with a blade about 0.4 to 1.4 inches long. They are ovate to subcircular in shape. The leafless flower stalks bear individual heads with disks 0.8 to 1.4 inches across. The ray flowers number 11 to 23 and possess yellow corollas 2 to 2.5 cm long. The disk flowers are strongly compressed. The silky-pubescent achenes bear 2 short awl-shaped awns connected by a whorl of short, fused scales, but sometimes the pappus are absent on the achenes. This variety appears as a geographically peripheral phase of the species *E. nudicaulis*, and is distinctive in habitat and morphological features (CMI 1996). The varietal name, *corrugata*, refers to its strongly ruffled-corrugate leaves (Mozingo and Williams 1980).

Status and Distribution

This variety of sunray is found in local populations in or near limestone mountain ranges or limestone outcrops. Historically, the plant occupied the southern end of Monitor Range, northern Belted Range, and the foothills of Quinn Canyon Range at elevations ranging from 3,300 to 6,400 feet amsl. (Beatley 1976). The elevational range was also reported from 2,300 to 2,410 feet in Mozingo and Williams (1980). The Ash Meadows sunray is endemic to Ash Meadows where it occupies dry washes and weathered saline soils. According to USFWS (50 FR 20777-20794):

> "It is one of the more common species of plants endemic to Ash Meadows but its populations have been reduced during the past 15 years by habitat elimination for agricultural production, the initial phases of PEC's development, and road construction."

PEC (Preferred Equities Corporation) is a real estate developer that purchased land in Ash Meadows during the 1980s.

In the late 1980s, the sunray was found throughout the Ash Meadows NWR, and was the most widespread of the rare species, but populations were destroyed during road construction, land leveling for crops, and alterations for municipal development between 1970 and 1985 (USFWS 1990: USFWS 2009b).

At Rogers-Purgatory-Longstreet springs along Carson Slough, the habitat is variably disturbed from clay mining and off-road vehicle use. There are two distinct populations in this area. In

central Ash Meadows, the populations are very large but are somewhat fragmented occurring from the terrace overlooking Old Rooker Ranch to Collins Ranch and southwest to Amargosa Reservoir. This area is riddled with roads, off-road vehicle tracks, agricultural fields, and other human-caused disturbances (Knight and Clemmer 1987). Within the southeast portion of Ash Meadows, sunray populations and habitat run from west of the county dirt road to Jack rabbit Spring and south nearly to Big Spring. The area is disturbed by county and private roads, private ranches, and natural and altered drainage patterns from the springs (Knight and Clemmer 1987).

Life History

There is little known about the life history and habitat requirements of the Ash Meadows sunray, particularly the reproductive phenology except that flowering occurs between April and May. It flowers coincidentally with the Ash Meadows milkvetch. A single plant usually produces a number of flowering stalks, each supporting an individual yellow flower (USFWS 1990).

It typically occurs in whitish, poorly drained, alkaline soils along dry washes or on pale, hard limestone outcrops. The region within which this plant grows is relatively dry; rainfall in Ash Meadows averages three to five inches per year, falling mainly in the autumn and winter with some sporadic summer rains (CMI 1996). *Enceliopsis* is generally a common component of the perennial flora. Much of the lower elevation alkali clay soils have underlying water table making the habitat inappropriate for *Enceliopsis* distribution. This is particularly true along the western and southern borders of the wildlife refuge (Knight and Clemmer 1987). It occupies habitats of the Ash Meadows milkvetch and Ash Meadows blazing star in addition to areas that are more densely vegetated with *Ambrosia dumosa*. According to Mozingo and Williams (1980), individuals are restricted to dry, upland areas outside the influence of water from seeps and springs. In CMI (1996) and Knight and Clemmer (1987), Ash Meadows sunray is associated with *Atriplex confertifolia*, *Haplopappas acradenius*, *Arctomecon merriami*, and *Cryptantha confertifolia*.

Threats to the Species

Recent losses of habitat due to agricultural and municipal/residential development activities, land clearing for road construction, groundwater removal and surface spring diversion and local mining activities, all have threatened the species habitat and ultimately their survival. Ash Meadows remained largely intact until 1967 when PEC purchased large tracts (approximately 20 square miles) in the northern and eastern regions. In their attempt to farm the land, they plowed large areas of land and installed pumps at the springs. These alterations virtually obliterated the natural features of the area including Carson Slough and its surrounding vegetation. Corporate farming failed in the area and it was abandoned in 1975 (CMI 1996).

Currently, the plant is threatened primarily by large-scale destruction of the native flora over large portions of the Ash Meadows area caused by continued agricultural development, road construction, and off-road vehicle activity (CMI 1996). Habitat destruction and mineral development has broken the hard, xeric alkali clay slopes of the upland topography into sporadic patterns (Knight and Clemmer 1987). The sunray's distribution appears to be limited to a

particular edaphic condition in washes weathered saline soils. Any further loss of its habitat would probably be detrimental to the species survival (CMI 1996).

Species in the Project Area

The Project area is located approximately 9 miles northwest of the nearest known locations of the species in Nevada at Ash Meadows and Carson Slough. The plant has never been found within the Project area, although the plant populations at Ash Meadows share some groundwater-related commonalities with the Project. The Ash Meadows Basin (includes most of Ash Meadows NWR) and Alkali Flat-Furnace Creek Basin (includes the Project and a small portion of Ash Meadows NWR) are connected by the Central Death Valley subregion of the Death Valley regional groundwater flow system.

Spring-Loving Centaury

Regulatory Status

The variety of spring-loving centaury (*Centaurium namophilum* var. *namophilum*) was proposed endangered under the Endangered Species Act on October 13, 1983 with six other rare plants and one insect species in Ash Meadows, Nevada and California (48 FR 46590-46598). However, USFWS later did not accept the validity varietal designations for *C. namophilum*, so the entire species was listed as threatened with designated Critical Habitat on May 20, 1985 (50 FR 20777-20794). The plant was included in a recovery plan at Ash Meadows with 11 other federally listed species in 1990 (USFWS 1990). In addition to federal protection, it is fully protected in Nevada, is a BLM Special Status Species in Nevada, and is considered threatened by the Nevada Native Plant Society (NNHP 2001). Approximately 1,840 acres of designated Critical habitat are scattered in or adjacent to Ash Meadows in Nye County, Nevada, approximately 7 miles southeast of the Project (USFWS 1990).

Species Description

The taxonomy of the spring-loving centaury has been a contentious issue since the 1970s. The spring-loving centaury was first collected in 1891 by Coville and Funston, while on the Death Valley expedition (Knight and Clemmer 1987), but was not described until 1973 by Reveal, Broome, and Beatley (Reveal et al. 1973; 50 FR 20777-20794). According to Broome (1981), the plants collected from the Furnace Creek area in Death Valley closely resembled specimens of C. *namophilum* var. *namophilum* found in Shoshone and Tecopa in Inyo County, but due to certain morphological characteristics, the specimens were likely to be a second variety; *C. n.* var. *nevadense*. During Broome's survey in 1981, she also found *C. n. namophilum* near Beatty, Nevada, although Morefield (1991) did not relocate it, but found several populations of *C. exaltatum* and *C. calycosum* instead. Intermountain flora and Jepson Manual treatments combined *C. n. nevadense* with *C. exaltatum*, and *C. n. namophilum* became a valid taxon without varietal distinctions. It is now officially identified as *Centaurium namophilum*, and is currently restricted to Ash Meadows (USFWS 2009d; Knight and Clemmer 1987; 50 FR 20777-20794; USFWS 1990).

This annual herb is a member of the pea family, comprised of over 65 genera and 600 species, is widely distributed, but most abundant in temperate regions. A colorless bitter juice is a distinguishing characteristic of the family (Munz 1974). The spring-loving centaury is an erect, annual herb, up to 18 inches tall with flowering stems borne from the base and flowering lateral branches. Stems and herbage are glaucous and the leaves are opposite, not forming basal rosettes. Stems are yellowish to tannish with internodes up to 4 cm long. Inflorescences extend more than half the length of the plant, and are paniculate-cymose (Knight and Clemmer 1987). Flowers are deep rose-pink above and below. The throat is yellowish with five dark purple spots below the juncture of adjacent petals (Reveal et al. 1973).

Status and Distribution

Historically, the plant probably occupied all the springs and seeps in the northern and eastern sections of Ash Meadows until development in the 1960s through 1980 reduced its distribution to small isolated patches. Cochrane (1981) identified 17 loealities at which the plant had been previously observed, and Knight and Clemmer (1987) reviewed data and identified seven general areas from which the species had been reported. In 1998, surveys targeted those seven locations, and as a result, the population was estimated to be approximately 175,000 plants on 522 aeres (BLM and USFWS 2000c).

The centaury is endemic to the Ash Meadows area of Nye County, Nevada. Its range includes the Ash Meadows NWR and adjacent public and private land. On public land managed by the BLM, the plant is found entirely within the Ash Meadows ACEC. Beginning in 2008, rangewide surveys are conducted for all rare plants throughout the Ash Meadows NWR. As a result of the survey effort for spring-loving centaury, the total population is estimated to be 4,468,571 individuals on about 800 acres (Bio-West 2008b). The likely reasons for the increase from 1998 to 2008 is most likely due to better, more comprehensive survey effort, natural fluctuations in the population size of an annual species, and differences in estimation protocols (USFWS 2009d).

According to Bio-West (2008b), the plants confirmed in the 2008 surveys were found at most of the previously recorded sites. In addition, distribution range of the plants in 1998 was extended in most locations to connect populations that were once believed to be separate. They found the plant to be widespread throughout the wildlife refuge in habitats that included seasonally flooded wetlands to seasonally moist alkali meadows, and the edges of some alkali scrub-shrub communities. In addition, they concluded that any habitat with surface or subsurface water was potential habitat for the species. The species has apparently extended beyond the wildlife refuge as well, but it is important to note, while the numbers have increased at most locations, other smaller populations reported in 1998 have apparently disappeared.

Based on the 2008 survey effort conducted by Bio-West (2008b), the current distribution includes six major subpopulations with additional minor subpopulations. They include: (1) Purgatory-Rogers-Longstreet-Five springs-North Carson Slough- T17S, R50E, Sections 10, 14-16, 20-23; (2) Scruggs-Mary-Scott-Indian Sehool-Crystal-marsh springs- T17S, R50E, Sections 7-10,and 15-18; (3) Unmapped seep west of South Springs Meadow road- T18S, R50E, Sections 14 and 23; (4) Point of Rocks Springs- T18S, R51E, Sections 7 and 12; (5) Jackrabbit-Big springs- T18S, R51E, Sections 18-19 and west from Big Spring extending into T18S, R50E,

Sections 14, 22-24; and (6) last Chance-Bole-Brahma springs- T18S, R51E, Sections 20, 29, and 30 (USFWS 2009d).

The land and management of spring-loving centaury within the wildlife refuge is 50 percent USFWS land, 45 percent BLM land, and 5 percent private land. No data are available for populations outside the wildlife refuge within the BLM Ash Meadows ACEC (USFWS 2009d).

Life History

The life history and habitat requirements of spring-loving centaury are largely unknown, but general observations indicate it is an annual species that flowers during the late summer and autumn (USFWS 1990). Aceording to Reveal et al. (1973), each flower develops into a narrow, linear seed capsule containing about 50 seeds, of which one plant can produee thousands. Like other plants, it likely has certain controls that delay germination, allowing it to persist in the soil seed bank for long periods (USFWS 2009d). The seeds are small (0.07 cm to 0.09 cm) and are easily dispersed by wind, water, and animals. Similar to other plants, most seed probably remains near the parent plant.

According to USFWS (2009b), it is unknown whether the centaury is self compatible or requires pollination, but based on the present distribution and population numbers, pollination probably does not limit reproduction. Even though little is known or understood about the centaury's life history, it is probably consistent with other species that have adapted to disturbed habitats (ruderal), like agriculture and other human-caused activities that impact habitats. Grime (1977) described ruderal plants with similar life histories as being adapted to disturbance, where the relative proportion of energy devoted to seed production is high, and capable of recovering from disturbance more quickly than other species.

The spring-loving centaury grows at elevations between 2,070 to 2,320 feet amsl in alkaline clay soils where water availability is a limiting factor (Pavlik and Manning 1986). It prefers moist to wet clay soils along the banks of streams or in seepage areas, habitat similar to that of Ash Meadows gumplant (USFWS 2009b). Where found, it occurs in abundance and is associated with *Cordylanthus tecopensis*, *Distichlis spicta*, var. *stricta*, *Baccharis emoryi*, *Fraximus velutina*, and *Prosopis* (Knight and Clemmer 1987), and *Pyrrocoma* spp., *Juncus balticus*, *Anemopsis californica*, *Nitrophila occidentalis*, *Atriplex* spp, *Tamarix* spp., *Typha* spp., and *Iva* spp. (NNHP 2001). According to Reveal et al. (1973) in USFWS (2009b), the plant typically grows in wet saltgrass meadows near springs and streams and occasionally in low uplands at seeps. Currently, the quantity of water discharged from the springs in the Ash Meadows area is stable and perennial. The amount of available habitat is expected to remain relatively constant from year to year except during high rainfall years where the number of individuals and extent of suitable habitat on drier sites would likely increase, because of increased soil moisture (USFWS 2009d).

Threats to the Species

The threats to spring-loving centaury are consistent with those of other Ash Meadows plants and ecosystem. They include: (1) Present destruction, modification, or curtailment of habitat or range (e.g. groundwater withdrawal, surface mining, non-native species; (2) overutilization for

commercial, recreational, scientific, or educational purposes (e.g. disease or predation); (3) inadequacy of existing regulatory mechanisms; (4) other natural or manmade factors affecting continued existence (e.g. vulnerability to environmental uncertainty, and climate change) (USFWS 2009d).

The spring-loving centaury depends on the outflow of springs and near-surface water for its survival, so local groundwater pumping negatively affects populations of the species (USFWS 2009d). At the time of listing, groundwater development was a major threat to the entire Ash Meadows ecosystem. Water levels in Devils Hole stabilized after groundwater pumping on the Ash Meadows NWR stopped in 1975; however, the water level at Devils Hole declined 7 cm between 1988 and 2004, and increased again after a wet year. As groundwater pumping at Ash Meadows decreased, it increased in the Amargosa Valley, and is currently occurring in some areas of the basin at about twice the rate predicted to be sustainable (USGS 2005).

Habitat loss or degradation from surface mining occurs in the Ash Meadows area. New mineral claims and subsequent mining could cause direct loss of spring-loving centaury, as well as indirect impacts by diverting or draining water away from occupied habitat. Surface mining of a valid existing mining claim on private land within the wildlife refuge, therefore, poses a significant threat to about 50 percent of the known occurrences of the centaury within the wildlife refuge that are open to public minerals. The existing claims do not occur near any of the large populations of the plant, so mining doesn't pose a significant threat to those populations (USFWS 2009d).

Non-native species impact approximately 42 percent of all federally listed and rare plants in the U.S. (Pimental et al. 2005). They compete directly with native species for water, nutrients, and sunlight, and indirectly by altering ecosystem processes such as nutrient cycling and fire regimes (Brooks et al. 2004). Over 100 non-native species, approximately 16 percent of the total flora, occur on Ash Meadows NWR. Of the total, six species could potentially threaten the centaury including salt cedar, Russian knapweed, five hook bassia, Malta star thistle, yellow star thistle, and hoary cress (USFWS 2006c). The wet meadows and old agricultural fields that support the species are also favorable conditions for non-native, noxious weeds. There are about 4,460 acres of old agricultural fields on Ash Meadows NWR, and some of these fields are nearly monocultures of non-native noxious weeds; however, approximately 315 acres or roughly 10 percent of spring-loving centaury habitat is threatened by non-native noxious weeds (USFWS 2009d).

Since the final listing rule was published for spring-loving centaury, laws and regulations were interpreted as simply providing recognition of the species' status, but no legal protection was afforded to the individual plants or their habitats. As a result of weak interpretation and enforcement of these laws and regulations in Nevada where the plant occurs, it further threatened the species' survival. Since the final listing rule was published, regulations have been strengthened and new regulatory mechanisms have been developed to protect and conserve the spring-loving centaury (USFWS 2009d).

Other natural or manmade factors affecting the species' continued existence include vulnerability to environmental uncertainty and climate change. Environmental uncertainty includes extreme flash flooding, which could affect the species, but because its distribution creates population

redundancy, flash flooding does not appear to be a serious threat to the centaury. The same holds true for climate change. Based on current climatic modeling, the southwestern U.S. is likely to experience increased frequency of regional drought in response to elevated levels of atmospheric carbon dioxide. The aquifer that supports the centaury is recharged from precipitation in the same area. If precipitation decreases significantly in the area, it could affect the plant, but to what level climate change will have on the local aquifer that supports the ecosystem and the plant is unknown. Monitoring groundwater change would be important to identifying climate change as a potential threat (USFWS 2009d).

Species in the Project Area

The Project area is located approximately 8 miles northwest of the nearest known locations of the species in Nevada at Ash Meadows and Carson Slough. The plant has never been found within the Project area, although the plant populations at Ash Meadows share some groundwater-related commonalities with the Project. The Ash Meadows Basin (includes most of Ash Meadows NWR) and Alkali Flat-Furnace Creek Basin (includes the Project and a small portion of Ash Meadows NWR) are connected by the Central Death Valley subregion of the Death Valley regional groundwater flow system.

3.6.4.6 Sensitive Plant Species

No special status plant species were located within the Project area during field surveys. However, two cactus species were located. Two individual beavertail prickly pear and seven golden cholla were found in the Project area (see Figure 3-9). Neither species is considered rare; however, both are protected by the State of Nevada's statute for the protection of Christmas trees, cacti, and yucca (NRS 527.060-.120).

Tecopa bird's-beak (*Cordylanthus tecopensis*) has been identified by the BLM as a species of concern in Nevada. This annual herb occupies moist alkaline meadows and flats, saltbush scrub within Mohave desert scrub. It is found in salt encrusted clay soils at 2,000 to 2,700 feet elevation along bottomlands of the Amargosa River drainage, east of Death Valley in California and Nevada and in Fish Lake Valley, Nevada. Locally, several populations occur in Ash Meadows, each following major drainage patterns of the springs. (NDOW 2003; Knight and Clemmer 1987; Mozingo and Williams 1980). Main threats to this species include water diversion, development, intensive recreation/OHV, non-native species, vandalism, vegetation encroachment (undesirable species), groundwater pumping, wild burros and livestock, rights-of-way, and mining (NDOW 2003; Mozingo and Williams 1980).

3.6.5 Wildlife Resources

The ROI for wildlife resources, including threatened, endangered, proposed, and candidate wildlife species, consists of areas that may be affected by permanent and temporary features of the Proposed Action and areas where groundwater withdrawal may impact surface water hydrology. The extent of the ROI for wildlife resources is based on the effects on surface waters discussed in the analysis provided in Water Resources-Section 3.4 this document. Based on these

criteria, the ROI for direct impacts on wildlife resources includes those areas in the immediate vicinity of the Proposed Action construction, operation, and maintenance activities. The ROI for indirect effects is the Amargosa Desert Hydrographic Basin.

3.6.5.1 Wildlife Observed with the Project Area

Fifty-eight vertebrate species were detected or seen over the course of the field surveys in the Project area during the spring and summer of 2009. Of these, 13 species were reptiles, 27 species were birds, and 18 species were mammals (Tierra Data 2009).

Thirteen species of reptiles were found or detected in the Project area during 2009 surveys (Table 3-14). The only protected reptile species detected was the Desert Tortoise which is listed as threatened under the Endangered Species Act and expanded upon in section 3.6.5.2.

Table 3-14 Reptiles Observed in the Project Area

Common Name	Scientific Name	Common Name	Scientific Name
Desert Tortoise	*Gopherus agassizii*	Desert Iguana	*Dipsosaurus dorsalis*
Long-nosed Leopard Lizard	*Gambelia wislizenii*	Zebra-Tailed Lizard	*Callisaurus draconoides*
Side-blotched Lizard	*Uta stansburiana*	Desert Horned Lizard	*Phyrnosoma platyrhinos*
Great Basin Whiptail	*Aspidocelis tigris*	Spotted Leaf-nosed Snake	*Phyllorhynchus decutatus*
Red Racer	*Masticophis flagellum*	Glossy Snake	*Arizona elegans eburnata*
Long-nosed Snake	*Rhinocheilus lecontei*	Nevada Shovel-nosed Snake	*Chionactis occipitalis talpina*
Mojave sidewinder	*Crotalus cerastes*		

Twenty-seven bird species were seen or detected within the Project area during 2009 surveys, although no nests were found (Table 3-15). Surveys revealed that avian nesting potential is low to moderate owing to the sparse nature of the vegetation. No active nests for any species were located during 2009 surveys. Of the 27 total species five are classified as sensitive: Swainson's Hawk, Prairie Falcon, Phainopepla, LeConte's Thrasher, and Burrowing Owl and are expanded upon in section 3.6.5.3.

Table 3-15 Bird Species Observed in the Project Area			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Great Egret	*Ardea alba*	White-faced Ibis	*Plegadis chihi*
Turkey Vulture	*Cathartes aura*	Cooper's Hawk	*Accipiter cooperii*
Swainson's Hawk	*Buteo swainsoni*	Red-tailed Hawk	*Buteo jamaicensis*
American Kestrel	*Falco sparverius*	Prairie Falcon	*Falco mexicanus*
Eurasian Collared Dove	*Streptopelia decaocto*	Mourning Dove	*Zenaida macroura*
Greater Roadrunner	*Geococcyx californianus*	Burrowing Owl	*Athene cunicularia*
Lesser Nighthawk	*Chordeiles acutipennis*	Ash-throated Flycatcher	*Myiarchus cinerascens*
Western Kingbird	*Tyrannus verticalis*	Common Raven	*Corvus corax*
Horned Lark	*Eremophila alpestris*	LeConte's Thrasher	*Toxostoma lecontei*
Phainopepla	*Phainopepla nitens*	Wilson's Warbler	*Wilsonia pusilla*
Chipping Sparrow	*Spizella passerina*	Black-throated Sparrow	*Amphispiza bilineata*
Lincoln's Sparrow	*Melospiza lincolnii*	Black-headed Grosbeak	*Pheucticus melanocephalus*
Great-tailed Grackle	*Quiscalus mexicanus*	House Finch	*Carpodacus mexicanus*
House Sparrow	*Passer domesticus*		

Twelve terrestrial mammal species were detected or observed in the Project area during the 2009 surveys (Table 3-16). No special status mammals were detected.

Large mammals are not thought to be common to this area, however, burro tracks were encountered frequently throughout the Project area and two burros were observed traversing the Project area during the spring surveys. Wild burros are managed by the BLM. The closest herd management area (HMA) is the Ash Meadows HMA. This HMA boundary lies approximately 5 miles to the southeast of the Project area. Data for this HMA was last collected in 1990, and estimated that there were no wild horses or burros present (BLM 2009b). In addition to burro presence, a Bighorn Sheep skull was found in Fortymile Wash. No other big game species were detected within the project area

In addition to the 12 terrestrial mammal species, 6 species of bats were detected during acoustic surveys in 2009 (Table 3-16). All of these species are considered sensitive species and are expanded upon in section 3.6.5.3. No roosting habitat was identified in the Project area.

Table 3-16 Mammal Species Observed in the Project Area			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Deer Mouse	*Peromyscus maniculatus*	Little Pocket Mouse	*Perognathus longimembris*
Long-tailed Pocket Mouse	*Perognathus formosus*	Merriam's Kangaroo Rat	*Dipodomys merriami*
White-tailed Antelope Squirrel	*Ammospermophilus leucurus*	Desert Cottontail	*Sylvilagus audubonii*
Black-tailed Jackrabbit	*Lepus californicus*	California Myotis	*Myotis californicus*
Yuma Myotis	*Myotis yumanensis*	Western Paratrelle	*Parastrellus Hesperus*
Townsend's Big-eared Bat	*Corynorhinus townsendii townsendii*	Pallid Bat	*Antrozonous pallidus*
Brazilian Free-tailed Bat	*Tadarida brasiliensis*	Domestic Dog	*Canis familiaris*
Coyote	*Canis latrans*	Kit Fox	*Vulpes velox*
Burro	*Equus asinus*	Sheep sp.	*Ovis* sp.

3.6.5.2 Federally Threatened, Endangered, Proposed, and Candidate Wildlife Species

The USFWS identified several threatened and endangered wildlife species with the potential of occurring in the proposed Project area or in the ROI. No proposed or candidate species were identified. Table 3-17 lists these species and identifies corresponding protection status under the Endangered Species Act, BLM, and NDOW.

Desert Tortoise (Mojave population)

Regulatory Status

The Desert Tortoise (*Gopherus agassizii*) consists of two geographically dissimilar populations: the Mojave and Sonoran. The Mojave population is defined as those tortoises north and west of the Colorado River and west of Beaver Dam Slope, Utah, and is distributed throughout southern Nevada, southeastern California, the Beaver Dam Mountains and Virgin River area of southwestern Utah, and northwestern Arizona. The Sonoran population is found in most of Arizona, western New Mexico, and south through Sonora to northern Sinaloa, Mexico. The Sonoran population of Desert Tortoises also occurs on Isla Tiburon, in the Sea of Cortez (Germano et al. 1994).

Table 3-17 Endangered and Threatened Wildlife Species that May Occur within the Region of Influence					
Scientific Name	**Common Name**	**Habitat**	**Endangered Species Act**	**State of Nevada**	**BLM**
Gopherus agassizii	Desert Tortoise (Mojave population)	Mojave desertscrub	Threatened	Protected	Sensitive
Cyprinodon diabolis	Devils Hole Pupfish	Devils Hole	Endangered	Protected	Sensitive
Cyprinodon nevadensis mionectes	Ash Meadows Amargosa Pupfish	Ash Meadows – large, warm waters	Endangered	Protected	Sensitive
Cyprinodon nevadensis pectoralis	Warm Springs Pupfish	Ash Meadows – Warm Springs Complex	Endangered	Protected	Sensitive
Rhinichthys osculus nevadensis	Ash Meadows Speckled Dace	Ash Meadows – large, warm waters	Endangered	Protected	Sensitive
Ambrysus amargosus	Ash Meadows Naucorid	Ash Meadows – Point of Rocks Spring	Threatened	–	Sensitive

Major declines and die-offs of Desert Tortoises were observed in the Mojave Desert in the 1980s, leading to the emergency listing of the Mojave population of Desert Tortoise as endangered on August 4, 1989 (54 FR 32326-32331). On October 13, 1989, the USFWS published a proposed rule to list the Mojave population as endangered (54 FR 42270-42278), but because the emergency rule expired on April 2, 1990, it was necessary to publish the final rule on that day, to prevent a lapse in protection for the tortoise. On April 2, 1990, the USFWS published a determination of threatened status for the Mojave population of Desert Tortoise with no Critical Habitat determination at that time (55 FR 12178-12191).

The Mojave population has been divided into six distinct population segments or recovery units, based on presumed evolutionary history (those population segments are sometimes deemed ESUs or evolutionarily significant units). Each recovery unit has been delineated based on variations in genetic, morphological, ecological, physiological, and behavioral traits (USFWS 2008), and a recovery plan was adopted in 1994 (USFWS 1994). Currently a revised recovery plan is being developed and is in draft form (USFWS 2008). A total of 6.4 million acres of Critical Habitat was designated in 1994 (59 FR 5820-5866). Within those six management units, Desert Wildlife Management Areas were identified, where populations of tortoises facing similar threats would be managed with the same strategies (59 FR 5820-5866).

The California and Nevada State Natural Heritage Programs have listed Desert Tortoises as imperiled, and in Utah they are considered critically imperiled (NatureServe 2009). The Desert Tortoise is protected by the State of Nevada (NNHP 2009). The Mojave population is on the

watch list of species in Clark County, Nevada, and it is considered sensitive by the BLM and USFS (NNHP 2009).

Species Description

The Desert Tortoise was first described by Cooper in 1863 as *Xerobates agassizii*, named after the iconoclastic Harvard professor Louis Agassiz. Over the years, scientists assigned it to different genera including, *Scaptochelys* (Bramble 1971), *Xerobates* (Lamb et al. 1989), and *Gopherus* (Crumley 1994), the genus under which it is now recognized.

The Desert Tortoise has a domed carapace and a relatively flat, unhinged plastron. Adults will reach a carapace length of 8 – 15 inches and shell height of 4 – 6 inches. Adults typically weigh 8 – 15 pounds. When hatchlings emerge from their eggs, they are approximately 2 inches long (Ernst et al. 1994).

The Desert Tortoise is greenish-gray to dark brown with tan scute centers. Their forelimbs have heavy, conical scales and are flattened for digging and burrowing. Hindlimbs are more elephantine. When limbs pull in, they block the openings of the shell (Ernst et al. 1994).

Status and Distribution

Population densities of the Desert Tortoise are decreasing in many areas, particularly in the western Mojave Desert (Corn 1994). According to a USGS report by Berry and Medica (1995), density estimates in 1990 ranged from approximately 13 to 168 adult tortoises per square mile depending on location. A study in southeastern Nevada found a density of approximately 17 tortoises per square kilometer (44 per square mile), and most populations discussed in that report showed a downward trend (Berry and Medica 1995).

Although population density studies have been conducted for many years in several areas throughout the Desert Tortoise's range, inconsistencies in sampling techniques, study scale, and study goals make long-term population trend determinations impracticable. Those data may however provide a general overview of the species' range-wide status and demonstrate considerable declines at the local level (USFWS 2008). Beginning in 2001 (1999 in the Upper Virgin River Recovery Unit) annual range-wide monitoring was initiated (USFWS 2006d). Results from the first 5 years of this program estimated a population density low of 2 to 8 tortoises per square mile for the NE Mojave Recovery Unit and a high of 44 to 78 tortoises per square mile for the Upper Virgin River Recovery Unit (USFWS 2006d). The Project area is located within the NE Mojave Recovery Unit. Because this monitoring program is designed to measure long-term population trends, the first 5 years of the program are essentially to establish baseline densities and variability between years and between recovery units (USFWS 2006d).

Life History

Tortoises of the Mojave population are found primarily in Mojave desert scrub. They are generally associated with communities dominated by creosote bush and other sclerophyll shrubs and small cacti (Germano et al. 1994). Some parts of their range may contain abundant Joshua

trees (*Yucca brevifolia*). In the Mojave Desert, the terrain is generally gently rolling alluvial fans with sandy or gravelly soils (Ernst et al. 1994).

Adequate burrowing substrate and thermal cover plant species are a crucial habitat component for Desert Tortoises. In the Mojave population, Desert Tortoises will construct their own burrows to avoid extreme hot or cold temperatures. They often excavate burrows under vegetation, up to 33 feet deep. Elevations at which tortoises occur in the Mojave population range from below sea level in Death Valley, California, up to about 5,000 feet at Yucca Mountain, Nevada (AZGFD 2001).

The annual reproductive cycle of the Mojave Desert Tortoise begins in February or March when they emerge from hibernation. Mating generally takes place in the spring and may last into fall (Ernst et al. 1994). Between one and 14 eggs are laid in an excavated nest near a shrub or burrow entrance between May and July (Ernst et al. 1994). Incubation generally lasts for 90 to 120 days. Egg hatch rates vary, but hatchling and juvenile mortalities are assumed to be very high, and it has been estimated that only one hatchling for every 15 to 20 nests will survive to reach sexual maturity (Lawler, no date). Average age of reproductive viability of females is primarily a function of animal size, but is usually between the ages of 12 and 25 years (USFWS 1994). Females produce from one to three clutches of eggs per year (Turner 1986).

Desert Tortoises are herbivores, consuming a wide variety of plant materials including dicot annuals, grasses, herbaceous perennials, trees, shrubs, sub-shrubs/woody vines, and succulents (AZGFD 2001). A study of their food habits in the Mojave Desert found that they used 43 plant species, including 37 annuals and 6 perennials. The diet showed a very strong preference for native plants (95.3 percent), and some of their preferred food plants were uncommon to rare (Jennings 1997). A study of juvenile tortoises found differences in diet between wet and dry summers. During a very dry summer, tortoises were observed foraging on only three species, but they used 15 species during a wet summer (Spangenberg 1995). Tortoises may forage selectively, sampling several possibilities before consumption (Oftedal 2002, Van Devender et al. 2002). Selective food preferences for individual tortoises within a population make plant diversity an important constituent of tortoise habitat (Tracy 2001). Desert Tortoises also ingest rocks, bones, and soil, possibly to maintain intestinal bacteria, to provide additional minerals, or as gastroliths to aid digestion (Esque and Peters 1994; Stitt and Davis 2003).

Threats to the Species

Desert Tortoises are facing numerous threats to their survival. Livestock grazing, recreational off-highway-vehicle (OHV) use, military training activities, urban development, disease, and increases in predation are some of the factors that affect tortoise survival by reducing or fragmenting available habitat, causing population declines (Lovich 1999). Additional threats include illegal collection of tortoises as pets, vandalism (shooting, crushing or mutilation), road-kill mortality, and use as human food (USFWS 1994; Stitt and Davis 2003).

The presence of livestock may affect tortoise habitat in several ways. Tortoises, their eggs, and hatchlings can be killed directly by trampling and collapsing burrows. Livestock also trample vegetation (e.g., creosote bush) that is utilized by tortoises to shade burrows, pallets, and for thermoregulation. Impacts from grazing include damage to soils crusts and cryptogamic soils

leading to increased erosion, decreased water infiltration due to soil compaction, and an increase in exotic annual vegetation, which compromises plant diversity and density, and increases fire fuel (USFWS 1994). Removal of native vegetation by livestock grazing allows the infiltration and proliferation of exotic plants on disturbed soils. Some of these invading exotic species include filaree (*Erodium cicutarium*), tumbleweed (*Salsola iberica*), split grass (*Schismus barbatus*), Arab grass (*S. arabicus*), cheat grass (*Bromus tectorum*), and red brome (*Bromus rubens*) (USFWS 1994), and are of decreased nutritional quality relative to native species (Oftedal 2002).

Invasion by exotic plants can have a negative impact on tortoises due to the changes that are effected in the native plant community. Red brome, for example, a European import, competes with native perennial grasses, shrubs, and annuals. Recurrent fires due to the presence of exotic ephemerals, such as red brome, can reduce the abundance and diversity of native forbs on which the tortoises depend (National Park Service [NPS] 2009). Increased fires also aggravate habitat fragmentation, which is a major contributor to tortoise population declines (USFWS 1994).

Effects to tortoises and tortoise habitat by OHV use include mortality by crushing on the surface or in burrows, collapsing of burrows, destruction of soil crusts and compaction of soils, soil erosion, proliferation of weeds, increase in wild fires, and damage or destruction of plants used for food, water, and thermoregulation (USFWS 1994). A study of food preferences found that the preferred plant species were often found in washes and on hills. These areas also are heavily used by recreational OHVs (Jennings 1997). Since tortoises are very particular in their food plant selection, reduction of available food sources due to damage from recreational OHVs can force the tortoise to change their diets. This may result in additional energy expenditures searching for acceptable food sources. When tortoises are forced to switch foods, they accrue a long-term digestive deficit due to the lag time in adjustment of their gut microflora to the new food source. Their effective feeding season is thus shortened (Tracy 2001).

Urban development has affected tortoises and tortoise habitat through habitat fragmentation and destruction. The construction of roads leads to habitat destruction, habitat fragmentation, road kills, and increased human access into formerly remote areas. The proliferation of landfills and illegal dumping subsidizes increased population densities of predators, including Common Ravens (*Corvus corax*), Coyotes (*Canis latrans*), and feral domestic dogs (*Canis familiaris*). These effects are greatest nearer to human settlements (USFWS 1994). Gila Monsters (*Heloderma suspectum*), snakes, skunks, and foxes are also tortoise egg predators (Ernst et al. 1994).

While predators are not normally a concern for tortoise populations in an undisturbed ecosystem, the perturbation of an ecosystem can cause predators to become a management issue. Increasing populations of generalist native predators have resulted in an increased rate of mortality of hatchling and juvenile tortoises. The USFWS's Breeding Bird Survey Program showed a 15-fold increase in raven populations in the Mojave Desert for the 20-year period from 1968 to 1988 (BLM et al. 1989). This surge in the raven population was attributed to increases in perching and nesting structures. The food supplies listed were road-kills, landfills, trash, garbage dumps, and agricultural developments. The perching structures listed were fence posts, power poles and towers, signs, buildings, bridges, and freeway access ramps. Elevated perches were historically scarce in the Mojave Desert, and such man-made substitutes provide perching sites for predatory

birds. Farrell (1989) documented ravens utilizing power line towers for perches while consuming juvenile tortoises (USFWS 1994). Human predation in the form of highway mortality and the illegal removal of adult tortoises for pets are also factors in the decreasing numbers of Desert Tortoises (Lovich 1999; 59 FR 5820-5866). Tortoises will urinate in response to harassments and this jeopardizes their survival through the summer due to water loss (Averill-Murray et al. 2002).

The manipulation of populations and/or individual tortoises during earlier conservation efforts was mostly unsuccessful. This may have been due to a lack of information regarding tortoise ecology, or poor planning. The translocation of in-situ tortoises and reintroduction of captive tortoises to the wild by the public are ongoing management problems. The historic lack of success of reintroductions can be attributed to several factors. Relocated tortoises often attempt to return to their home ranges (Blythe et al. 2004) and they face increased vulnerability to predators and potential antagonistic responses from resident tortoises. Perhaps the largest problem facing potential relocation efforts is the potential for the spread of diseases, especially upper respiratory tract disease (URTD), and genetic pollution.

Recently, URTD has been found to be a significant contributor to tortoise mortality, and this disease is widespread in the Mojave population. URTD is caused by a bacterium (*Mycoplasma agassizii*), and it may be aggravated by simultaneous infections from other bacteria. URTD has been reported in a variety of tortoise species from around the world. It is likely that it has been spread through the wild populations by the release of infected, captive tortoises (Jacobson 1992). One of the main reasons for the emergency listing of Mojave Desert Tortoises in 1999 was the observed die-offs of populations due to URTD.

Groundwater withdrawal may cause the development of large fissures (Koehn Dry Lake, Saltdale, California) which act as pit-fall traps that can capture tortoises. Tortoises can also be trapped in utility trenches. Railroad tracks fragment tortoise habitat and their movements may be constrained by train rails (Edwards et al. 2004; 59 FR 5820-5866).

Species in the Project Area

A small Desert Tortoise population is known to exist approximately 25 miles to the northwest of the Project area near Beatty, NV. Desert Tortoise surveys conducted in 2006 (Knight and Leavitt 2006) and in 2007 (Converse Consultants 2008) for proposed mining operations, indicate population densities of 0-10 tortoise per square mile. The DOE, Nevada Test Site is located northeast of the Project, and has been extensively surveyed for Desert Tortoise over many years (Rautenstrauch and O'Farrell 1994). These surveys have indicated low to very low densities of Desert Tortoise.

To the south and east of the project site, in the Pahrump Valley and an area known as Johnny, surveys were conducted over years that also indicated low densities of Desert Tortoise (Tierra Data 2009).

Desert Tortoise surveys were conducted within the footprint of the proposed project from late March through May, 2009. Four Class 4 burrows were observed on the 7,670 acres surveyed during a time when tortoises would have been most active (Figure 3-10). Class 4 burrows are burrows with deteriorated condition that are probably utilized by Desert Tortoise. No dead or

live tortoises were observed nor were any shells, scutes or bone segments of dead tortoise detected in washes or ponding areas during high water events. Generally, even if no other tortoise sign is detected during survey activities, tortoise remains can be found in washes (Tierra Data 2009).

Devils Hole Pupfish

Regulatory Status

The Devils Hole Pupfish (*Cyprinodon diabolis*) was listed by the USFWS as an endangered species on March 11, 1967 (32 FR 4001). The species was listed as critically endangered by the State of Nevada on January 1, 1969 (USFWS 1980). The species is currently listed as a protected species by the State of Nevada (NNHP 2009).

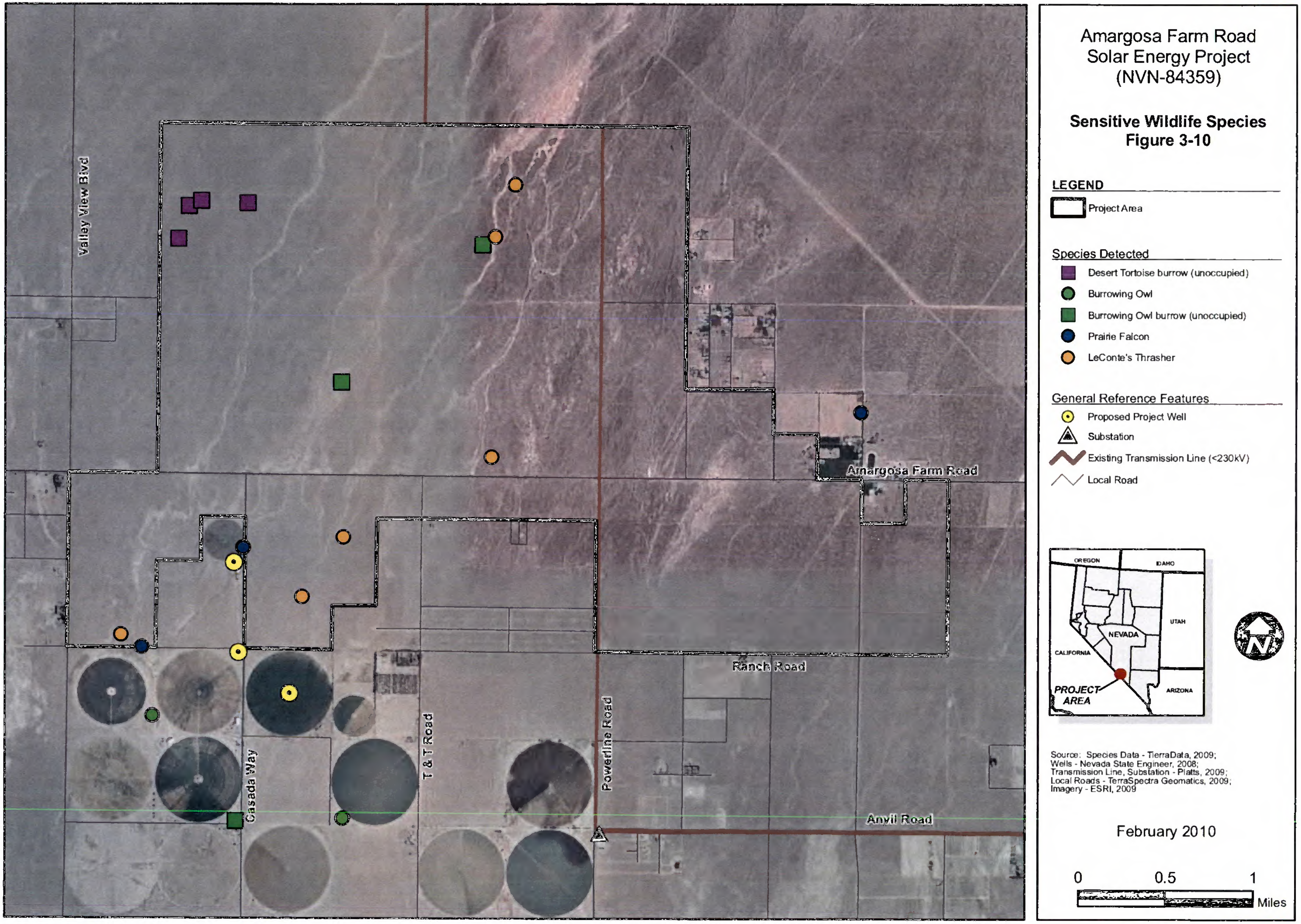
Maintaining the water level of Devils Hole is critical to the survival of the species. In 1976, the U.S. Supreme Court upheld the rights of the National Park Service to maintain the water levels at Devils Hole at no more than 2.7 feet below the copper marker (a copper washer in the wall of Devils Hole) over the water right holders in the vicinity of Devils Hole (426 U.S. 128, Cappaert vs. U.S.; USFWS 1980; USFWS 1990).

Species Description

The Devils Hole Pupfish is among the smallest of the pupfish species reaching a maximum length of 0.98 inches. The body shape is similar to that of other pupfish as it possesses a large head and eyes and a long anal fin. However, this species lacks pelvic fins and vertical bars that are typical in other *Cyprinodon* species. The male Devils Hole Pupfish is typically a pale blue color with breeding males becoming a solid dark blue with a black terminal band on the caudal fin, violet gill covers, and a brownish to silver colored back. The females lack ocellus on their dorsal fin and are colored yellowish-brown along the back (Baugh and Deacon 1983, USFWS 1990, USFWS 2009b, USFWS 2009e).

Status and Distribution

This species is endemic to a single limestone cave called Devils Hole, which is located at the east-central boundary of the Ash Meadows NWR. The species has been isolated from other pupfish for an estimated 10,000 – 20,000 years (Soltz and Naiman 1978), and has always been small in numbers fluctuating from a maximum of 553 fish in the summer to a minimum of 127 fish in the winter (USFWS 1990). The population reached a low of 38 individuals in 2006 for reasons that are not clear (Hillyard and Van Breukelen 2009), but it appears the decline is not correlated with declining water levels. However, studies are on-going to determine what may be impacting the species (Wilson et al. 2009).


Valley View Blvd
Amargosa Farm Road
Ranch Road
Casada Way
T & T Road
Powerline Road
Anvil Road
Amargosa Farm Road
Solar Energy Project
(NVN-84359)
Sensitive Wildlife Species
Figure 3-10
LEGEND
Project Area
Species Detected
Desert Tortoise burrow (unoccupied)
Burrowing Owl
Burrowing Owl burrow (unoccupied)
Prairie Falcon
LeConte's Thrasher
General Reference Features
Proposed Project Well
Substation
Existing Transmission Line (<230kV)
Local Road
OREGON
IDAHO
NEVADA
UTAH
CALIFORNIA
ARIZONA
PROJECT AREA
N
Source: Species Data - TierraData, 2009; Wells - Nevada State Engineer, 2008; Transmission Line, Substation - Platts, 2009; Local Roads - TerraSpectra Geomatics, 2009; Imagery - ESRI, 2009
February 2010
0
0.5
1
Miles

Small refugium populations have been established in the Amargosa Pupfish Station in Ash Meadows NWR and in facilities constructed by the Bureau of Reclamation located near the base of Hoover Dam along the Colorado River (USFWS 1990). Despite these efforts, none of the refugia were able to sustain a viable population of Devils Hole pupfish and no longer remain active (Mapula et al. 2009).

Life History

The species inhabits the limestone cave known as Devils Hole. Essential habitat for this species encompasses 21,760 acres of the area where groundwater removal most influences the water level in Devils Hole. This extends northwest of Devils Hole to within approximately 8 miles of the Project area. This species is highly dependent upon a limestone shelf where feeding and spawning are focused. This shelf can become unusable to the pupfish should the water level drop too low (Soltz and Naiman 1978). The Devils Hole Pupfish is an opportunistic feeder. During the fall and summer months, the pupfish primarily feeds on diatoms, but also feeds on algae (*Spirogyra*) and invertebrates such as amphipods, ostracods, and protozoa. Less frequent food items include beetles (*Stenelmis* sp.), a turbellarians (*Dugesia* sp.), and snails (*Tryonia* sp.) (Baugh and Deacon 1983, USFWS 1990).

Spawning occurs year-round due to the relatively constant water temperature of 32°C maintained in Devils Hole (Baugh and Deacon 1983). Spawning peaks in the spring during the maximum photoperiod (USFWS 1990), and eggs are fertilized when deposited onto a limestone substrate ledge where they incubate (Baugh and Deacon 1983, USFWS 1990).

Threats to the Species

The primary threat to the Devils Hole Pupfish is decreased spring discharge due to pumping of surface and groundwaters for agriculture and other activities in the Amargosa Valley (USFWS 1980). By the late 1960s, ranching in the area altered most springs with heavy machinery, cleared extensive areas of riparian and marsh vegetation, decreased spring discharge by pumping surface and groundwaters, diverting water into earthen and concrete-lined ditches, and impounding waters. The population of the Devils Hole Pupfish declined to fewer than 150 individuals following these activities (USFWS 1980).

Much of the spawning and foraging activities of the pupfish occurs within 6.5 by 13 foot ledge. If water levels drop below that ledge, the Devils Hole Pupfish could suffer extreme population declines.

Species in the Project Area

The Devils Hole Pupfish does not occur within the Project area. The entire population is known only from Devils Hole is located 12.5 miles southeast from the edge of the Project area. Devils Hole and the Project area are located within the Nevada portion of the Amargosa Desert Hydrographic Basin (#230), which is a part of the Death Valley Hydrographic Region (#14).

Ash Meadows Amargosa Pupfish

Regulatory Status

The Ash Meadows Amargosa Pupfish (*Cyprinodon nevadensis mionectes*) was emergency listed as endangered on May 10, 1982 (47 FR 19995-19999). This listing was in effect until January 5, 1983 at which time a second emergency listing and a proposal of endangered status with Critical Habitat were published concurrently (48 FR 608-625). A determination of endangered status and Critical Habitat was published on September 2, 1983 (48 FR 40178-40186). Critical Habitat was designated at Fairbanks, Rogers, and Longstreet Springs and three unnamed springs in the northwest corner of Section 23, T17S, R50E; Bradford, Jackrabbit, Big, and Point of Rocks Springs; Crystal Pool; and their outflows areas. All Critical Habitat for this subspecies is located within the Ash Meadows National Wildlife Refuge (48 FR 40178-40186). The species is listed as a protected species by the State of Nevada (NNHP 2009).

Species Description

The Ash Meadows Amargosa Pupfish is a short, deep, slab-sided fish with a long head and strongly arched nape. This subspecies has low fin-ray and scale counts relative to other *Cyprinodon* species. The breeding males are iridescent silver-blue with a yellowish-olive color along the back anterior to the dorsal fin (Soltz and Naiman 1978).

Status and Distribution

The Ash Meadows Amargosa Pupfish tends to occupy relatively large habitats that are 14.5 to 79 feet in diameter and are relatively warm with constant temperatures of 24 to 30°C (Soltz and Naiman 1978). The subspecies is known to have been extirpated from Bole, Deep, and Forest Springs (48 FR 40178-40186). In 1990, this subspecies was known to occupy 10 spring areas and was established in clay ponds within Ash Meadows NWR. Population estimates from June 1982 reported 568 individuals from Jackrabbit Spring and 1,189 individuals from Big Spring. Estimates from July 1983 reported 1,189 individuals from Jackrabbit Spring and 1,822 from Big Spring (USFWS 1990).

Surveys were conducted between fall 2007 and summer 2008. These surveys resulted in a minimum population of 5,635 individuals captured in the winter of 2008. The highest number of individuals was detected in the summer of 2008 resulting in 8,346 individuals within the Ash Meadows NWR. The largest populations were consistently located in the Crystal and Fairbanks Springs systems in addition to the outflow from Peterson Reservoir. Additional large populations were located in the Kings, Jackrabbit, Big, and Longstreet Springs (USGS 2008).

Life History

Like other pupfish, the Ash Meadows Amargosa Pupfish is omnivorous, a subspecies thought to be similar to that of the Amargosa Pupfish (*C. n. amargosae*) which also feeds primarily on a mixture of algae and detritus throughout the year. Small invertebrates are consumed opportunistically (Naiman 1979).

Spawning typically occurs from February to September, but can occur year-round when conditions are suitable. Spawning peaks in the spring with females depositing one or two eggs at a time in a substrate of silt, sand, detritus, and/or algae (Soltz and Naiman 1978).

Threats to the Species

The subspecies is endemic to a very small area that is dependent upon the integrity of the Ash Meadows ecosystem including undisturbed flows from the Ash Meadows basin aquifer. Alteration of surface and groundwater flows could greatly impact the pupfish's population survival or growth (48 FR 40178-40186).

Introduction of nonnative predatory organisms such as Largemouth Bass (*Micropterus salmoides*), Red Swamp Crayfish (*Procumbarus clarkii*), and Bullfrog (*Rana catesbeiana*) are an additional threat because these exotics are known predators of the Ash Meadows Amargosa Pupfish. Other introduced species such as the Sailfin Mollie (*Poecilia latipinna*), Convict Cichlid (*Archocentrus nigrofasciatus*), and Mosquitofish (*Gambusia affinis*) are known to outcompete and replace the pupfish (48 FR 40178-40186; USGS 2008). Intensive efforts to remove Sailfin Mollies and Convict Cichlids were undertaken in 2008, and based on the most recent surveys, have failed to capture either of these species indicating removal efforts may have been successful (USGS 2008; McKelvey and Taylor 2009).

Species in the Project Area

The Ash Meadows Amargosa Pupfish does not occur within the Project area. Its known range is located within the Amargosa Desert Hydrographic Basin (#230). The Project area is also located within the Nevada portion of this Basin, which is a part of the Death Valley Hydrographic Region (#14). Fairbanks Spring is the closest known population of Ash Meadows Amargosa pupfish to the Project area. It is located approximately 8 miles southeast from the edge of the Project area.

Warm Springs Pupfish

Regulatory Status

The Warm Springs Pupfish (*Cyprinodon nevadensis pectoralis*) was listed as endangered without Critical Habitat on October 13, 1970 (35 FR 16047-16048). The species is listed as a protected species by the State of Nevada (NNHP 2009). Essential habitat includes all known populations and is located entirely within the Ash Meadows NWR (USFWS 2009a). Essential habitat includes the area in which groundwater pumping is most likely to have an adverse affect to the discharge of Warm Springs (USFWS 1990).

Species Description

The Warm Springs Pupfish is the smallest of the subspecies of pupfish, with a shorter, deeper body and more numerous pectoral fin rays and displays the strongest tendency towards reduction

and loss of pelvic fins. Breeding males appear similar to the Ash Meadows Amargosa Pupfish with readily seen yellow on the nape (Soltz and Naiman 1978).

Status and Distribution

Warm Spring Pupfish habitat is relatively small, the water is less than 6.5 feet in diameter and 4 feet deep and is relatively warm with constant temperatures of 30 to 33°C (Soltz and Naiman 1978). This pupfish is isolated from other subspecies; found only in the Warm Springs Complex of Ash Meadows NWR. These springs have been isolated from other water bodies for several hundred years. This pupfish historically occupied seven springs within the complex, but one such spring (Mexican Spring) dried up in 1973 and is no longer inhabited (Soltz and Naiman 1978). Currently, the Warm Spring Pupfish occupies North Scruggs, South Scruggs, Marsh, North Indian, South Indian and School Springs (Sada and Mozejko 1984).

Surveys were conducted between fall 2007 and summer 2008. These surveys revealed a minimum population of 322 individuals captured in the spring of 2008. The highest number of individuals was detected in the fall of 2007 revealing 765 individuals within the Ash Meadows NWR. The School Springs underwent restoration during the survey period and was not surveyed completely, which may account for the low numbers found during the two seasons, as this spring complex showed the largest numbers prior to initiation of restoration work. Also, during restoration, exotic species such as Red Swamp Crayfish and Mosquitofish (*Gambusia affinis*) were eradicated, after which pupfish numbers increased at Warm Springs (USGS 2008).

Life History

Like other pupfish, the Warm Springs Pupfish is omnivorous, and is thought to be similar to that of the Amargosa Pupfish (*C. n. amargosae*) which also feeds primarily on a mixture of algae and detritus throughout the year. Small invertebrates are consumed opportunistically (Naiman 1979).

Spawning typically occurs from February to September, but can occur year-round when conditions are suitable. Spawning peaks in the spring with females depositing one or two eggs at a time in a substrate of silt, sand, detritus, and/or algae (Soltz and Naiman 1978).

Threats to the Species

This pupfish is endemic to a very small area that is dependent upon the integrity of the Ash Meadows ecosystem including undisturbed flows from the Ash Meadows basin aquifer into the Warm Spring Complex. Alteration of surface and groundwater flows could greatly impact the Warm Springs Pupfish population survival or growth (USFWS 1990).

Introduction of nonnative predatory organisms to pupfish habitat such as Mosquitofish, Red Swamp Crayfish, and Bullfrog are an additional threat. These species, in particular, are known to prey upon and/or out-compete the Warm Springs pupfish (USFWS 1990). Intensive efforts to remove Mosquitofish and Red Swamp Crayfish from the School Springs system were undertaken in January 2008. Surveys following eradication of these species indicate an increase in Warm Springs Pupfish populations in addition to confirming complete eradication of Red Swamp

Crayfish and Mosquitofish (USGS 2008). A major goal of Ash Meadows NWR is the continued eradication of Red Swamp Crayfish and Mosquitofish from the Warm Springs Complex in 2009-2010 including from the North and South Indian Springs. If these goals are achieved, only one spring system within the Warm Springs Complex (the South Scruggs Spring system) will contain these non-native invasive species (Weissenfluh et al. 2009).

Species in the Project Area

The Warm Springs Pupfish does not occur within the Project area. Its known range is located within the Amargosa Desert Hydrographic Basin (#230). The Project area is also located within the Nevada portion of this Basin, which is a part of the Death Valley Hydrographic Region (#14). The entire population is only known from the Warm Springs Complex located approximately 11 miles southeast from the edge of the Project area.

Ash Meadows Speckled Dace

Regulatory Status

The Ash Meadows Speckled Dace (*Rhinichthys osculus nevadensis*) was emergency listed as endangered on May 10, 1982 (47 FR 19995-19999). This emergency listing was in effect until January 5, 1983 at which time a second emergency listing and proposal of endangered status with Critical Habitat were published concurrently (48 FR 608-625). A determination of endangered status with designated Critical Habitat was published on September 2, 1983 (48 FR 40178-40186), which included Bradford Springs, Jackrabbit Spring, Big Spring, and their outflows, all of which are located within the Ash Meadows NWR (48 FR 40178-40186). The species is currently listed as a protected species by the State of Nevada (NNHP 2009).

Species Description

The Ash Meadows Speckled Dace is a small fish with a maximum length of 3.9 inches and varies widely in their coloration. Typically the dorsum is olive-gray that blends ventrally to a golden color (USFWS 1990). The subspecies has black speckles and splotches covering the body with one or two distinct lateral stripes (Soltz and Naiman 1978; USFWS 1990). The degree of speckling and completeness of the lateral stripes varies between the isolated populations. It has a slightly overhung snout and small fins (Soltz and Naiman 1978).

Status and Distribution

The Ash Meadows Speckled Dace is thought to have historically occupied the same springs and outflows as Ash Meadows Amargosa Pupfish, which tends to occupy relatively large habitats that are 14.5 to 79 feet in diameter and are relatively warm with constant temperatures of 24 to 30°C (Soltz and Naiman 1978; USFWS 1990). In 1990, this fish was known to occupy four springs within Ash Meadows NWR including Bradford, Big, Tubbs, and Jackrabbit Springs. Population surveys were conducted in June 1982 and July 1983 that resulted in an estimated total population of 500 individuals within Ash Meadows NWR (USFWS 1990).

Surveys were conducted between fall 2007 and summer 2008. These surveys revealed a minimum population of 1,009 individuals captured in the summer of 2008. The highest number of individuals was detected in the winter of 2008 revealing 1,552 individuals within the Ash Meadows NWR. Ash Meadows Speckled Dace were located in five spring complexes including, Bradford 1 Spring, Bradford 2 Spring, Forest Spring, Jackrabbit Spring, and Point of Rocks Spring. Point of Rocks and Forest Springs each resulted in fewer than 10 individuals during each survey period. The two systems with the highest population sizes were Bradford 1 Spring and Jackrabbit Spring. Surveys in Big and Tubbs Springs, which historically maintained populations of Ash Meadows Speckled Dace, failed to locate any individuals (USGS 2008).

Life History

Like other speckled dace, the Ash Meadows Speckled Dace is omnivorous, feeding on bottom surfaces for insect larvae, crustaceans, diatoms, snails, and algae as would be expected from their downward-shaped mouth (Soltz and Naiman 1978). Occasionally mid-water or surface food or insects will be consumed (USFWS 1990).

Spawning primarily occurs during the spring but a second spawning can occur in the summer. Spawning occurs over stream riffles where eggs are fertilized as they drift into the substrate (Soltz and Naiman 1978, USFWS 1990).

Threats to the Species

The subspecies is endemic to a very small area that is dependent upon the integrity of the Ash Meadows ecosystem including undisturbed flows from the Ash Meadows basin aquifer. Alteration of surface and groundwater flows could greatly impact the Ash Meadows Speckled Dace population survival or growth (USFWS 1990).

Introduction of nonnative invasive organisms to the habitat such as Largemouth Bass, Mosquitofish, Red Swamp Crayfish, and Bullfrogs are an additional threat. These species, in particular, are known to prey upon and/or outcompete the Ash Meadows Speckled Dace (USFWS 1990; USGS 2008). Intensive efforts to remove Largemouth Bass, Mosquitofish and Red Swamp Crayfish from the southern springs have been ongoing since the 1990s and more intensive during 2007 and 2008 (USGS 2008). Current restoration efforts at Fairbanks and Soda Springs are expected to provide reintroduction opportunities for expanding the current range of the Ash Meadows Speckled Dace into the northern springs of the Ash Meadows NWR from where the speckled dace was historically known (Andress et al. 2009; Bio-West 2009).

Species in the Project Area

The Ash Meadows Speckled Dace does not occur within the Project area. Its known range is located within the Amargosa Desert Hydrographic Basin (#230). The Project area is also located within the Nevada portion of this Basin, which is a part of the Death Valley Hydrographic Region (#14). Bradford Springs is the closest known population of Ash Meadows Amargosa Pupfish to the Project area. It is located approximately 13 miles southeast from the edge of the Project area.

Ash Meadows Naucorid

Regulatory Status

The Ash Meadows naucorid (*Ambrysus amargosus*) was listed as threatened with designated Critical Habitat on May 20, 1985 (50 FR 20777-20794). Critical Habitat includes Point of Rocks Springs and their immediate outflows (50 FR 20787).

Species Description

The Ash Meadows naucorid is a member of the family *Naucoridae* whieh are commonly called creeping water bugs. The species has an average adult length of 0.24 inches (Parker et al. 2000). The species is a dull brown color with scattered dark yellow markings on the head, thorax, and legs. It is a flightless insect with hind legs modified for swimming and raptorial forelegs for capturing prey (Dominguez 2006).

Status and Distribution

Originally, the Ash Meadows naucorid was only known from an area at Point of Rocks Springs where flowing water passes over rock and pebble substrates (USFWS 1990). Water diverted from Point of Rocks Springs to aid recovery efforts for the Devils Hole Pupfish resulted in a reduction of suitable habitat for the Ash Meadows naucorid. In 1997, Ash Meadows naucorids were introduced into the Kings Pool outflow and later into the channel 16-33 feet below Kings Pool. Additional individuals were added in 1998 to supplement the fledgling population. By 2002, the population of naucorids in Kings Pool was extinet. In February 2009, water which had previously been diverted to the Devils Hole Pupfish refuge was returned to its original flow in the main stream channel at Point of Rocks. This nearly doubled the discharge and expanded the suitable habitat for naucorids. Reintroductions are being proposed to reestablish naucorids throughout their historic range (Parker et al. 2009).

Life History

Naucorids feed by piercing the exoskeleton of invertebrates and sucking out the body fluids. Feeding trials showed that *Hyalella* (amphipods), *Elmidae* larvae, and baetid mayfly nymphs were selected for while elmid beetle adults, snails and flatworms were not consumed (Parker et al. 2000).

Population levels peak in the spring and summer in response to reproduction activities. Fecundity is low with females only producing approximately seven eggs at a time. Selection of oviposition substrate is not clear, however, researchers have noted that eggs have been found on gravel, pebble and cobble substrates as well as from submersed vegetation, but no eggs have been reported from coarse sand or boulder substrates. Ash Meadows naucorids have five nymphal instars. Individuals may overwinter as adults or late instar nymphs (Parker et al. 2000).

Threats to the Species

The Ash Meadows naucorid is endemic to a very small area that is dependent upon the integrity of the Ash Meadows ecosystem including undisturbed flows from the Ash Meadows basin aquifer. Its current range is greatly reduced from its known historic range due to channelization of the springs' outflow for agricultural diversion in addition to other flow-restricting alterations made at Point of Rocks Springs. Alteration of surface and groundwater flows could impact the Ash Meadows naucorid population survival or growth by decreasing spring discharge (50 FR 20782).

Species in the Project Area

The Ash Meadows naucorid does not occur within the Project area. Its known range is located within the Amargosa Desert Hydrographic Basin (#230). The Project area is also located within the Nevada portion of this Basin, which is a part of the Death Valley Hydrographic Region (#14). The entire population is only known from Point of Rocks Spring located approximately 15 miles southeast from the edge of the Project area.

3.6.5.3 Other Sensitive Species

Several wildlife species of concern were acknowledged by BLM and NDOW as warranting special consideration this document. They are briefly discussed below.

Reptiles

There are two reptile species of concern. The Desert Iguana is on the NNHP Plant and Animal Watch List, which means it is vulnerable to decline by habitat loss. The Project area consists of potentially suitable habitat for the Desert Iguana such as creosote bush on sandy soils. The second reptile that has been identified as a conservation priority species is the Nevada Shovel-nosed Snake. The Project area consists of potentially suitable habitat for this species such as dry desert washes and sparse vegetation.

Amphibians

Two sensitive species of amphibians naturally occur in Nye County. The Amargosa Toad (*Bufo nelsoni*) is currently under review for listing under the Endangered Speeies Act. This species is largely restricted to the Amargosa River around the towns of Springdale and Beatty, Nevada (Stebbins 1985). Although it may be found in a few other subsidiary creeks, none of them flow through the Project area. The southern end of the Amargosa Toad's range is in the Oasis Valley near Beatty, approximately 25 miles north of the Project area. Additionally, due to the lack of any permanent water within the Project area this species is not expected nor was it found within the Project area (Tierra Data 2009).

The Columbia Spotted Frog (*Rana luteiventris*) is also known from Nye County. However, the southern end of the range of the Columbia Spotted Frog extends to Cloverdale Creek located over 100 miles north of the Project area (TSFTT 2004).

Birds

Swainson's Hawk is considered a sensitive species by the BLM Nevada office and is a protected species under Nevada state law. Five Swainson's Hawks were observed at the southwestern corner of the Project area, perched in and adjacent to the alfalfa field located immediately south of the Project area. These hawks were apparently feeding on large insects, such as grasshoppers, available in the field. This species is strongly migratory, and was not seen again on the Project area during the spring surveys.

Prairie Falcon is considered a sensitive species by the BLM Nevada office and is a protected species under Nevada state law. Prairie Falcons were observed three times during the 2009 surveys, always perched on telephone poles adjacent to agricultural fields (see Figure 3-10). It is likely that these agricultural fields regularly attract local Prairie Falcons, due to the increased number of prey available there. Desert habitats support relatively lower numbers of prey and would be utilized by raptors for hunting much less frequently than agricultural fields.

LeConte's Thrasher is considered a sensitive species by the BLM Nevada office and is a protected species under Nevada state law. LeConte's Thrashers were observed on three occasions during the surveys (see Figure 3-10). These observations included adults in addition to recently fledged young. LeConte's Thrasher naturally occurs at low densities, and since the entire site is potential habitat, it is possible that a small number of pairs are present throughout the site.

Phainopepla (*Phainopepla nitens*) is considered a sensitive species by the BLM Nevada office and is a protected species under Nevada state law. No suitable nesting habitat was observed within the Project area. A single Phainopepla was observed perched on a tamarisk tree in a residential area along the eastern edge of the Project area.

Burrowing Owl is considered a sensitive species by the BLM Nevada office and is a protected species under Nevada state law. Two burrows previously occupied by owls were located during the 2009 surveys within the Project area (see Figure 3-10). Both of these burrow complexes had not been occupied in some time, as there were spider webs and debris in the entrances, very old whitewash, and bleached rodent bones and old pellets. No fresh pellets or feathers or prey remains were found, which suggests occupancy by wintering owls. It would be expected that the majority of owls using this area would be wintering owls, and a minority would remain to breed. Given the low productivity of the desert at this site, in terms of the very sparse vegetation and low insect and rodent populations, the only areas that are suitable for supporting breeding owls are those adjacent to the irrigated alfalfa fields.

A local resident identified an occupied Burrowing Owl burrow 1 mile south of the Project area along Casada Road in a residential lot adjacent to an alfalfa field (see Figure 3-10). One owl was observed during the visit, though the resident said that a pair of owls had fledged several young earlier in the year. In general, a low density of wintering owls could potentially occur throughout the Project area where there are suitable burrows. Breeding Burrowing Owls are most likely to be located adjacent to the alfalfa fields, where the prey base is significantly more abundant than the surrounding desert.

Focused surveys failed to observe or detect Bendire's Thrasher (*Toxostoma bendirei*) or Loggerhead Shrike (*Lanius ludovicianus*) in the Project area.

Bats

Six bat species were detected within the Project area. All six species are special status species. These are listed in Table 3-16. The majority of these bat species are found throughout Nevada, the exception being Yuma Myotis which is known from the southern and western half of Nevada. Except for the Brazilian Free-tailed Bat, these species are year-round residents that hibernate in the winter, rousing periodically to actively forage or drink. The Brazilian Free-tailed Bat is a summer resident that migrates to South America during the winter. These species utilize many different types of roosts, including mines, caves, buildings, rocks, hollow trees, bridges, vegetation, and exfoliating bark, although no roosting habitat is present in the Project area. All six species are invertevores, consuming moths, arthropods, flies, beetles, and aquatic insects (Bradley et al. 2006). Based on the positive results of the Anabat survey, there is suitable foraging habitat for the bats in the Project and surrounding area.

3.7 Historic and Cultural Resources

This section of the EIS addresses cultural resources, including the results of a cultural resource study that was completed in support of the proposed Project (Thompson et al. 2009).

3.7.1 Regulatory Framework

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties. For the purposes of Section 106, historic properties are defined as including prehistoric and historic sites, buildings, structures, districts, landscapes, and objects included in or eligible for inclusion in the National Register of Historic Places, as well as artifacts, records, and remains related to such properties (National Register Bulletin 36). Historic properties can also include those cultural resources that are associated with the cultural practices or beliefs of a living community (National Register Bulletin 38).

3.7.2 Affected Environment

A cultural resource study consisting of a detailed records review and intensive pedestrian survey was conducted in support of the Proposed Action (Thompson et al. 2009). The study was conducted to identify those cultural resources located within the Project's Area of Potential Effects (APE), and make recommendations on their eligibility for listing on the National Register of Historic Places. These efforts were undertaken to support the preparation of the EIS and meet the BLM's Section 106 responsibilities, as well as to comply with other federal laws and executive orders, such as Executive Order Number 13007, cultural resources and Indian sacred sites

The APE encompasses 7,798.24 acres and includes the Project's power block, laydown area, office, maintenance building, switchyard, and detention basin (Thompson et al. 2009). If there are changes to the Project's APE as project development and engineering proceed, these new areas will be examined for cultural resources as needed. The cultural resource inventory for the current Project area resulted in the recordation of thirteen new prehistoric and historic sites. Of the thirteen sites, only one prehistoric site has been determined eligible for listing on the National Register of Historic Places under criterion 'd'. This criterion pertains to this site's potential to yield information important to prehistory. This site has the potential to be adversely affected by construction of this Project. Mitigation through a formal archaeological Treatment Plan involving data recovery would need to occur prior to any proposed ground disturbance.

Through coordination with two of the Tribes that have direct ties to the Project area, there are no known sacred sites or cultural areas of concern within the Project area. Mitigation of the one prehistoric site determined eligible to the NRHP using the formal BLM Protocols are deemed appropriate.

3.8 Paleontological Resources

Paleontological resources are any fossilized remains, traces, or imprints of organisms that are preserved in the Earth's crust and are of paleontological interest and provide information about the history of life on Earth. Fossil remains may include bones, teeth, shells, leaves, and wood. They are found in geological deposits within which they were originally buried. Paleontological resources include not only the actual fossils, but also the collecting localities and the geological deposits that contain the fossils.

This section presents an overview of the paleontological resources, the location of any known paleontological localities, and the possibility of discovery of fossil resources within the Project area. This section also discusses the regulatory framework for paleontological resources, describes the methods used in the study, and presents a summary of the inventory results. The purpose of this inventory is to identify localities of known significant paleontological resources and to infer where potential significant paleontological resources may be present and potentially affected by construction-related activities.

3.8.1 Regulatory Framework

Federal, state, and local governments have enacted legislation providing for varying degrees of protection for fossil resources. The Society of Vertebrate Paleontology (SVP) regards paleontological resources as "nonrenewable scientific and educational resources that, along with their accompanying contextual data, constitute part of our natural heritage," (http://www.vertpaleo.org/society/polstatconformimpactmigig.cfm). This paleontological resource inventory was conducted in accordance with the regulations that are applicable to the paleontological resources within the Project area.

3.8.1.1 Federal

The Federal Antiquities Act of 1906 and the Paleontological Resources Preservation Act of 2009 (PRPA) serve as the primary, federal legislation that requires addressing potential impacts to paleontological resources on federally administered lands. The Federal Antiquities Act of 1906 (16 USC 431 433) provides for protection of both historic and prehistoric items on federal land. The NEPA (42 USC 4321-4347) directs federal agencies, including the BLM, to fully assess and manage impacts (adverse or not) to the environment. The FLPMA (PL 94-579) provides for management and mitigation of adverse impacts on federal land by "protecting the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values." Paleontological resources are viewed as having scientific value and requiring protection under the auspices of the FLPMA. The PRPA was enacted as part of the 2009 Omnibus Public Land Management Act and codified specific protection for vertebrate fossil resources and scientifically significant plant and invertebrate fossil resources on federal land. The PRPA created criteria for the issuance of paleontological collection permits and directed the secretary of the interior to ensure that paleontological resources from federal land are properly placed into the collections of approved repository institutions.

3.8.1.2 State

NRS §381.197 govern the protection of historic and prehistoric sites on state and federal lands in Nevada. Per this statute:

"A person shall not investigate, explore, or excavate an historic or prehistoric site on federal or states lands or remove any object there from unless he is the holder of a valid and current permit issued pursuant to the provisions of NRS §381.195."

NRS §381.195 through §381.219 state that:

"An applicant is required to secure, from the Museum Director of the Nevada State Museum, or an agent designated by the Museum Director, a permit for the investigation, exploration, or excavation of any state or federal lands within the boundaries of the State of Nevada."

These statutes also define the requirements for the permitting and disposition of any collected paleontological material found on Nevada land.

3.8.1.3 Local

No local protection of paleontological resources is known to pertain to the Project area.

3.8.2 Data Collection Methods

The Project area refers to the area that encompasses the proposed right-of-way and associated components. The ROI for paleontological resources includes a 1-mile buffer around the Project area. Information for the inventory was obtained from a review of the scientific literature and

from record searches at paleontological institutions. A review was condueted of relevant published and unpublished geological and paleontological reports, and museum paleontological locality records. Paleontologieal locality record searches were requested from the Nevada State Museum in Carson City, Nevada, and the San Bernardino County Museum in Redlands, California. Following standard procedure, any known paleontological localities within 1 mile of the Project area were noted. A search for paleontological localities within the ROI was also conducted using records from the University of California, Santa Barbara, Paleobiology Database. The literature and record searches found no paleontological localities within the ROI.

A paleontological resources survey was conducted on February 2 and 3, 2010 in order to determine the nature of the Quaternary-Tertiary marl deposits mapped by Slate et al. (1999) and whether the mapped marl deposits contain paleontological resources.

3.8.2.1 Paleontological Potential

Information about the geological units and known fossil localities in the region was used to identify the paleontological potential of geological units within the Project area. Paleontological potential levels were assigned to each geological unit using the Potential Fossil Yield Classification (PFYC) system that was adopted by the BLM in 2007 for assessing paleontological potential on federal land (BLM Staff 2008). The PFYC system is a five-tiered system that the BLM uses to classify geological units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate and plant fossils and their potential to be adversely impacted, with a higher class number indicating a higher potential. This classification system is applied to the geological formation, member, or other distinguishable map unit, preferably at the most detailed mappable level. This approach was followed in recognition of the direct relationship that exists between paleontological resources and the geological units within which fossils are entombed. By knowing the geology of a particular area and the fossil productivity of particular geological units that occur in the area, it is possible to predict where fossils will likely be found. Each class is defined below:

Class 1. Very Low Potential – geological units not likely to contain reeognizable fossil remains. These units include igneous, metamorphic, and Precambrian rocks.

Class 2. Low Potential – sedimentary geological units not likely to contain vertebrate fossils or scientifically significant non-vertebrate fossils; these units include Aeolian, diagenetically altered, and Holocene sediments.

Class 3. Moderate or Unknown Potential – fossiliferous sedimentary geological units where fossil content varies in significance, abundance, and predictable occurrence; sedimentary units of unknown fossil potential. Class 3 is divided into two parts:

Class 3a. Moderate Potential – units are known to contain vertebrate fossils or scientifically significant non-vertebrate fossils, but these occurrences are widely scattered; common invertebrate or plant fossils may be found in the area.

Class 3b. Unknown Potential – units exhibit geological features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or area is known. This may indicate the unit or area is poorly studied and field surveys may uncover significant fossils.

Class 4. High Potential – geological units that contain a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability.

Class 5. Very High Potential – highly fossiliferous geological units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils.

3.8.2.2 Potential for Paleontological Resources in the Project Area

Three geological units have been mapped within the Project area: Young alluvial deposits (Qay), intermediate alluvial deposits (Qai), and Quaternary-Tertiary marl deposits (QTm) (Slate et al. 1999); as discussed previously in the section on geological hazards and mineral resources (see Figure 3-2). Results of the paleontological resources survey, however, determined that there are only two geological units present in the Project area.

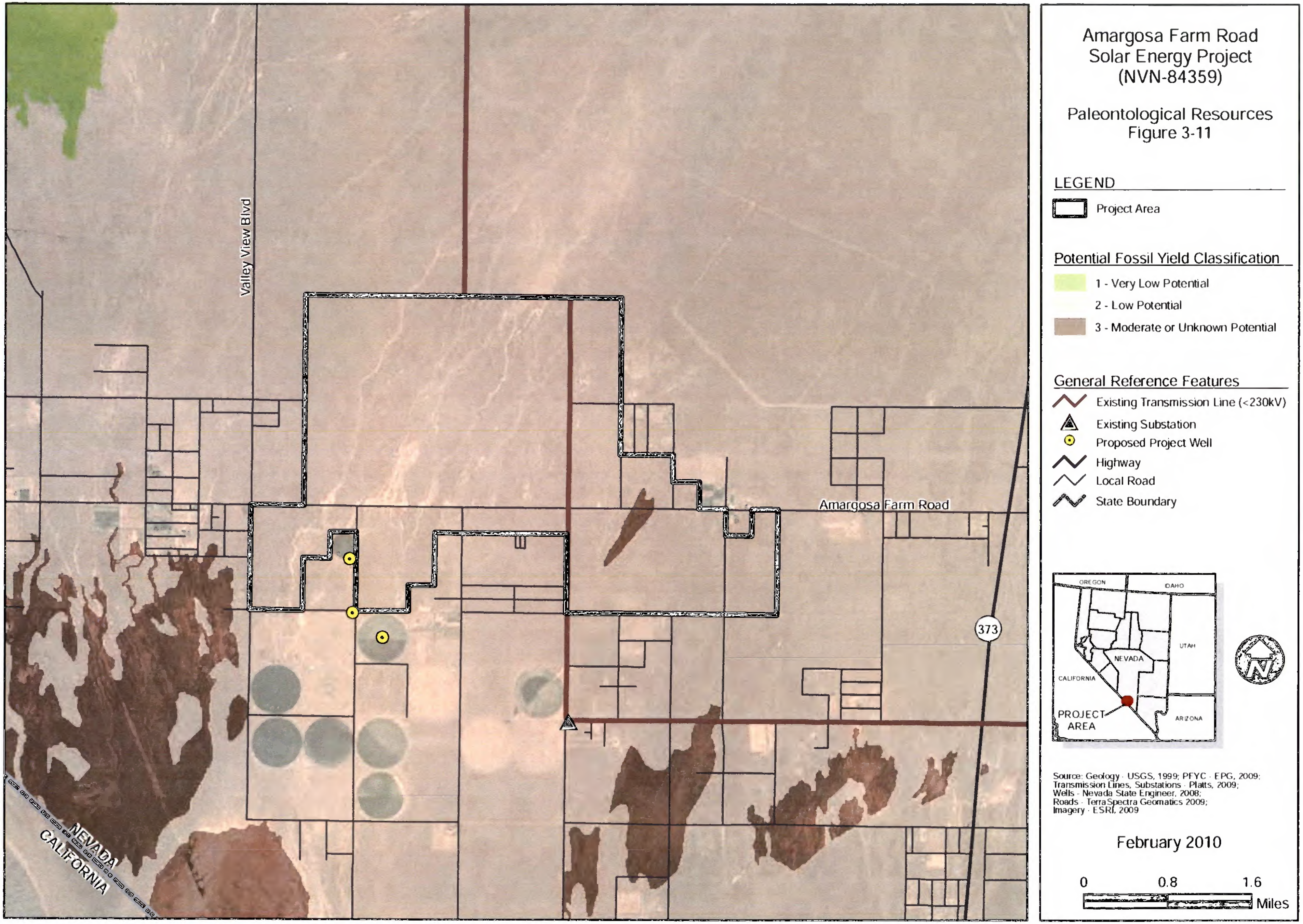
Field evidence indicates that the marl deposits exposed in the Project area are not marl or ancient spring deposits as mapped by Slate et al. (1999), but are caliche deposits (another type of limestone deposit) that are part of a paleosol (an ancient soil). Field observations further indicate that these caliche deposits are part of the intermediate alluvial deposits (Qai). Therefore, the only geological units present in the Project area are the young alluvial deposits and the intermediate alluvial deposits. Each of these units has been assigned a PFYC value by the BLM based upon their physical nature, depositional history, probable fossil content, and age (Figure 3-11).

Young alluvial deposits of Holocene age are the youngest geological unit within the Project area. These alluvial deposits have a low potential for paleontological resources and have been assigned a PFYC of 2 as a result of their young age, which decreases the chances of preserving paleontological resources. Intermediate alluvial deposits range in age from the Pleistocene to the early Holocene. Field observations show that caliche deposits are common in the intermediate alluvial deposits. Exposures of caliche deposits in washes and in prospect pits commonly contain fossil root casts and root traces. The root casts and root traces are not considered to be scientifically significant by the BLM. No other fossils were found in the Project area during the paleontological resources survey.

The intermediate alluvial deposits have a low potential for paleontological resources and have been assigned a PFYC of 2, because of the alluvial nature of these deposits and the low potential for scientifically significant fossils in the caliche deposits. The slightly older age of these deposits relative to the young alluvial deposits may result in a relatively higher chance of discovering fossil material, but still warrants a PFYC of 2 based on the deposit's overall alluvial nature (Figure 3-11).

Amargosa Farm Road
Solar Energy Project
(NVN-84359)

Paleontological Resources
Figure 3-11



Source: Geology · USGS, 1999; PFYC · EPG, 2009; Transmission Lines, Substations · Platts, 2009; Wells · Nevada State Engineer, 2008; Roads · TerraSpectra Geomatics 2009; Imagery · ESRI, 2009

February 2010

3.9 Socioeconomics

This section characterizes the existing social and economic conditions within the ROI. The ROI for the socioeconomic analysis is Nye and Clark counties in Nevada, with an emphasis on the communities closest to the Project area, such as Amargosa and Beatty, as well as larger communities within 2 hours of the site, such as Pahrump and Las Vegas.

3.9.1 Data Collection Methods

The socioeconomic inventory describes the following current socioeconomic conditions:

- County and community descriptions
- Demographic and economic characteristics
- Housing, including housing occupancy and average value of homes
- Fiscal revenue and expenditures
- Public infrastructure and services

Demographic and economic data is provided for communities located closest to the Project area, as well as communities with a population of over 20,000 within a 2-hour commute of the Project site.

The nearest community with a population over 20,000 is Pahrump, followed by the Las Vegas metropolitan area. Corresponding data for the State of Nevada is included to set the Proposed Action in a regional context. Data were obtained from the U.S. Census Bureau, U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis, and the Nevada State Demographer's Office.

3.9.2 Social Characteristics

3.9.2.1 Population

As shown in Table 3-18, most of Nevada's population is located in Clark County (71.8 percent). In 2000, the population of Clark County was 1,394,440. In 2008, the estimated population was 1,967,716, a 41 percent increase from 2000. Of this total, 96 percent live within the Las Vegas metropolitan area (Nevada State Demographer's Office 2009).

In comparison, Nye County's population in 2000 was 32,978. In 2008, the estimated population of Nye County was projected at 47,370, an increase of 43 percent (Nevada Demographers Office). At 18,159 square miles, Nye County is the third largest county in the continental United States. Located over 100 miles north of the Project area, Tonopah, the county seat, has an estimated population in 2008 of 2,628. The majority of the county's population is concentrated in one unincorporated city: Pahrump, with 38,882 people, approximately 82 percent of the county's population base. Other unincorporated towns near the Project area include: Amargosa Valley with 1,521 people and Beatty with 1,024 people. The remaining population is located in isolated private residential areas throughout the county.

Nye County's sparse population can be attributed, in part, to the lack of available private land for development. In fact, 97 percent of the county's land area is administered by the federal government. Of the 11.6 million acres of land in Nye County, approximately 11.3 million acres are administered by the following federal agencies:

- BLM (6.5 million acres; 8,400 acres are jointly managed with the USFWS)
- USFWS (13,700 acres)
- USFS (1.9 million acres)
- DOD (1.8 million acres)
- DOE (863,000 acres)
- NPS (107,000 acres)
- Bureau of Indian Affairs (8,000 acres)

An additional 19,000 acres are under state jurisdiction, and a total of 249,000 acres in Nye County are privately owned.

As shown in Table 3-18, the Las Vegas metropolitan area in Clark County and Pahrump in Nye County have seen some of the highest growth rates in the nation. In contrast, the economies of Amargosa and Beatty have historically been tied to government (Nevada Test Site), mining, and agriculture; slow population growth rates have reflected the declines of these economic sectors.

Table 3-18 Population Estimates for Nevada, Clark County, and Nye County

Geographic Area	Population (2000)	Population (2008)	Percent Change
Nevada	2,023,378	2,738,733	35.4%
Clark County	1,394,440	1,967,716	41.1%
Las Vegas	482,389	593,528	23.0%
N. Las Vegas	117,650	214,661	82.5%
Henderson	179,144	269,538	50.5%
Unincorporated*	552,151	798,535	44.6%
Nye County	32,978	47,370	43.6%
Pahrump	24,235	38,882	60.4%
Amargosa	1,167	1,521	30.3%
Beatty	1,152	1,024	-11.1%

*Unincorporated portion of the Las Vegas metropolitan area, including Mt. Charleston and Indian Springs (Nevada State Demographer's Office 2009)

Although Pahrump's population has grown at an average rate of 7.2 percent per year since the mid-1990s, the rest of the county has remained relatively stable, with some towns experiencing a slight decline in population (EDEN 2007). Nye County's historic dependency on the mining sector and activities at the Nevada Test Site has resulted in unstable population growth rates

between 1970 and 2002, indicating the need for economic diversification in the county (EDEN 2007).

The population of Nevada is projected to increase dramatically during the next 20 years. The Nevada State Demographer's population projections estimate that Nevada's population will increase by nearly 66 percent between 2008 and 2025. The highest rates of growth are anticipated to occur between 2005 and 2010, as shown in Table 3-19. The 2008 population is derived from Census 2000 projections, and is not the same as the 2008 estimate provided by the US Census (Nevada State Demographer's Office 2008). The population projections are estimated from historic population trends and do not account for future probable and foreseeable developments and events.

Table 3-19 Population Projections for State of Nevada, Clark County, and Nye County

	Nevada		Clark County		Nye County	
Year	Projected Population	Percent Change	Projected Population	Percent Change	Projected Population	Percent Change
2008	2,789,884		2,008,063		49,383	
2010	2,963,812	6.2%	2,148,122	7.0%	55,028	11.4%
2015	3,321,189	19.0%	2,433,175	21.2%	66,292	34.2%
2025	3,872,937	38.8%	2,863,501	42.6%	81,852	65.7%

Source: Nevada State Demographer's Office 2008

3.9.2.2 Housing

Table 3-20 and Table 3-21 summarize the housing characteristics of major population centers in the ROI. Housing data was obtained from the U.S. Census Bureau. The estimated total of housing units in Nye County in 2008 was 16,503 units, an increase of 3.6 percent from the estimated 15,934 housing units in 2000. The number of housing units in Clark County increased by 44.8 percent from 559,799 units in 2000 to 810,602 units in 2008.

Short-term housing is available in the ROI in the form of hotels and motels. In 2009, there were 3, 1, and 5 hotels and motels in the communities of Pahrump, Amargosa, and Beatty, respectively. Based on information from the website TravelNevada.com, there are approximately 613 guest rooms among the 9 hotels and motels in these areas.

Additional temporary housing is available in communities within 2 hours of the proposed Project site, with many more rooms available in the Las Vegas metropolitan area.

Additional housing opportunities are available in the form of recreational vehicle facilities, mobile home sites, and campgrounds.

Table 3-20 Housing Characteristics						
Area	**2000 Number of Units**	**2000 Vacant Units**	**2000 Percent Vacant**	**2006-2008 Number of Units**	**2006-2008 Vacant Units**	**2006-2008 Percent Vacant**
State of Nevada	827,457	76,292	9.2	1,098,307	151,160	13.8
Clark County	559,799	47,546	8.5	784,892	108,275	13.8
Las Vegas	190,862	14,014	7.3	236,730	29,005	12.3
N. Las Vegas	36,585	2,574	7.0	72,104	8,235	11.4
Henderson	71,428	4,887	6.8	108,316	12,628	11.7
Nye County	15,934	2,625	16.5	16,592	3,202	19.3
Pahrump	11,669	1,477	12.7	13,134	2,069	15.8
Amargosa	541	112	20.7	N/A	N/A	N/A
Beatty	738	198	26.8	N/A	N/A	N/A
Source: U.S. Census 2009a,b						

Nye County generally has slightly lower housing values and costs when compared to Clark County, while Amargosa has slightly lower housing values and costs than those of Nye County. Table 3-21 summarizes these housing values and costs across the study area.

Since 2008, it is likely that housing vacancy rates have increased, while housing values and costs have dropped as a result of the economic downturn, availability and access to credit, and the impacts on the housing market in Nevada. As such, it is likely that these vacancy rates are higher and median housing values are lower than those reported in the 2006 to 2008 3-year estimates.

3.9.3 Economic Characteristics

The economy of Nye County has historically been supported by mining, agriculture, railroad operations, and federal defense research and development activities. Mining and agriculture have been the dominant economic activities in Nye County and continue as a source of income; however, the relative importance of agriculture and mining has decreased in recent decades. Both sectors are still important in the local economy but constitute a smaller share of employment and personal income sources. The historic economy has also been characterized by the "bust and boom" cycles of a mining economy, as shown by periods of high population growth, no population growth, and population declines.

Table 3-21 Housing Values and Costs						
Area	2000 Median Housing Values	2006-2008 Median Housing Values	2000 Average Monthly Mortgage Costs	2006-2008 Average Monthly Mortgage Costs	2000 Median Monthly Gross Rental Costs	2006-2008 Median Monthly Gross Rental Costs
State of Nevada	132,500	296,200	1,190	1,796	699	999
Clark County	132,200	299,200	1,185	1,839	716	1,037
Las Vegas	133,100	293,700	1,164	1,803	699	989
N. Las Vegas	120,900	275,700	1,131	1,871	644	1,123
Henderson	151,400	357,300	1,299	1,972	857	1,204
Nye County	96,300	187,100	866	1,239	541	848
Pahrump	106,500	200,200	870	1,252	612	942
Amargosa	80,800	N/A	N/A	N/A	380	N/A
Beatty	76,100	N/A	794	N/A	368	N/A
Source: U.S. Census Bureau 2009a,b; figures are in nominal dollars.						

Table 3-22 summarizes the labor force characteristics of the State of Nevada and Clark and Nye counties. The table includes state labor force data to provide a regional context for the county labor force data. Unemployment rates steadily declined between 1990 and 2008 for the State of Nevada and Clark and Nye counties, but recently rates have increased due to the economic slowdowns.

Table 3-22 Labor Force Characteristics of the State of Nevada, Clark County, and Nye County – 1990-2008						
	Nevada		Clark County		Nye County	
Year	1990	2008	1990	2008	1990	2008
Labor Force	655,896	1,373,462	407,763	987,998	8,945	17,764
Employment	622,516	1,282,012	387,881	922,878	8,616	16,036
Unemployment	33,380	91,450	19,882	65,120	329	1,728
Unemployment Rate	5.1%	6.7%	4.9%	6.6%	3.7%	9.7%
Source: NV Dept of Employment, Training and Rehabilitation – Research and Analysis Bureau 2009						

While agriculture and mining activity have decreased in Nye County, these industries are still important basic industries in that they bring money into the county economy through sales to non-local businesses and individuals. The county's agricultural industry produced cash receipts of $23.8 million in 2007 (most recent available data) (USDA National Agricultural Statistics Service 2009). Typically, the manufacturing sector is also a fundamental basic industry, as the sector generally provides significant employment and income for local economies.

Table 3-23 summarizes the number of people employed by all economic sectors in the State of Nevada and Clark and Nye counties in 2007. Clark County has 90.7 percent and Nye County has 87.6 percent of their employment in the private sector, indicating their economies are much more service-based than Nye County. Federal, state, and local government employed more than 11 percent of the total employed labor force in Nye County. This indicates the strong dependence of the Nye County economy on government agencies.

Table 3-23 Employment by Industry for the State of Nevada, Nye County, and Clark County for 2007

Industry	Nevada	Clark County	Nye County
Farm	4,835	319	255
Total private	1,492,783	1,071,680	16,425
Forestry, Fishing, etc.	1,886	295	74
Mining	14,512	1,495	1,044
Utilities	4,680	3,168	131
Construction	156,837	117,360	1,571
Manufacturing	54,528	29,071	229
Wholesale Trade	44,853	29,057	193
Retail Trade	171,545	120,390	2,142
Transportation and warehousing	57,709	39,784	291
Information	20,518	14,941	137
Finance and insurance	75,034	56,004	478
Real estate	121,332	84,729	1,736
Professional, scientific, technical services	88,541	60,967	2,532
Management	19,447	14,807	34
Administrative and waste services	109,530	80,915	1,268
Educational services	11,393	7,941	D
Health Care and social assistance	102,592	69,497	D

Table 3-23 Employment by Industry for the State of Nevada, Nye County, and Clark County for 2007			
Industry	**Nevada**	**Clark County**	**Nye County**
Arts, entertainment, recreation	52,576	34,927	962
Accommodation and food services	318,494	260,814	1,614
Other services, except public administration	66,776	45,518	953
Total Government	168,913	109,324	2,068
Federal, civilian	17,119	11,235	157
Military	14,672	12,179	115
State, local	137,122	85,910	1,796
State	33,329	15,536	167
Local	103,793	70,374	1,629
Total	**1,666,531**	**1,181,323**	**18,748**
Source: US Dept of Commerce, Bureau of Economic Analysis (D – not reported, confidential but included in total)			

Nye County employment in the construction sector was less than 9 percent of total county employment, which contrasts with construction employment of more than 9 percent in Clark County and the State of Nevada. Construction services generally are purchased primarily by local businesses and individuals. In 2007, total personal income for Nye County was $1.35 billion and for Clark County was $71.6 billion. The total personal income for Nevada was $101.8 billion (US Dept of Commerce 2009).

According to an economic development strategy analysis prepared by the University of Nevada, rural counties often lose population in age groups 20 to 34 years because the young people with the best education, health, and the most marketable skills and abilities leave the rural areas to realize their potential in areas with greater economic opportunities. In addition to the out-migration of young persons, increased rates of retiree in-migration in recent years has raised concerns that the growing elderly population would require greater levels of public services in a narrowing economy characterized by a shrinking revenue base.

Personal current transfer receipts include government payments to individuals for retirement and disability insurance benefits, medical payments (mainly Medicare and Medicaid), income maintenance benefits, and veteran's benefits. In Nye County, personal current transfer receipts accounted for 22.7 percent of total personal income compared to 10.6 percent in Clark County and 10.7 percent in the State of Nevada or Clark County, which is an indicator of a larger proportion of retirement age population in Nye County (US Dept of Commerce 2009).

Employers in the Amargosa Valley are dispersed throughout the valley from US Highway 95 south to the Nevada/California state line. Table 3-24 lists the major employers in the area and the

number of employees. It is unknown how many of these employees reside in the Amargosa Valley and how many commute from Pahrump or Las Vegas. Most of the other employers in the area employ less than 10 people.

Table 3-24 Major Employers in Amargosa Valley

Company	Number of Employees
Ponderosa Dairy	120
Horizon Academy	50
Industrial Mineral Ventures	30
US Ecology	30
Amargosa Valley School	29
Longstreet Inn and Casino	17
Cind-R-Lite	17

Source: Amargosa Valley School 2009; Bagley 2009; Bowlin 2009; EDEN 2009; NBMG 2008; Powell 2009

3.9.3.1 Income

Median household income and per capita income data was obtained from the U.S. Census Bureau; the most recent available data for the communities within the ROI was a 3-year average, 2006 to 2008. U.S. Census Bureau data for 2006 to 2008 was not available for towns with less than 20,000 residents, such as Amargosa and Beatty. In 1999, Pahrump had the lowest median household and Beatty had the lowest per capital income levels compared with other communities in the region and the two counties.

3.9.4 Public Services and Utilities

3.9.4.1 Law Enforcement and Emergency Services

Law enforcement in the Amargosa Valley is provided by the Nye County Sheriff's Department and the Nevada Highway Patrol. The Sheriff's Department has one substation in Amargosa Valley and three full time deputies. The area is also supported by a substation in Beatty which has one Lieutenant and three deputies. The Nevada Highway Patrol has three officers that patrol the highways in the area with a substation located in Pahrump (Amargosa Valley Area Plan Committee 2009).

Emergency services within Amargosa Valley are provided mainly by the Amargosa Valley Volunteer Fire Department managed by the Town of Amargosa Valley. There are two fire halls located in the area. The Nye County Emergency Services Department provides assistance to the local volunteers, including training. The BLM is responsible for fire protection for wildland fires

on public land. Mercy Air Flight for Life helicopters provides emergency airlift services between Amargosa Valley and hospitals in Las Vegas. The Amargosa Valley Medical Clinic provides routine family medical care and is staffed by a visiting physician and physician's assistant (Amargosa Valley Area Plan Committee 2009).

3.9.4.2 Electricity and Natural Gas

The Project area is served by Valley Electric Association. Valley Electric Association is a nonprofit electric utility based in Pahrump, Nevada. Valley Electric's service territory covers more than 6,800 square miles, mainly along the California-Nevada border. At present Valley Electric provides electricity to approximately 16,000 customers (Valley Electric Association 2009).

There are no natural gas services in the Amargosa Valley.

3.9.4.3 Public Water Supply and Wastewater

There are very few public water supply systems in the Amargosa Valley Planning Area. The majority of water users rely on individual wells. There are only three public water supply systems near the Project area. These include wells supplying the Amargosa Elementary School, Amargosa Town Complex, and the Amargosa Water Company. As of 2008, over 500 domestic wells were listed in the NDWR database as being drilled in the Amargosa Valley Hydrographic Basin.

There are no wastewater treatment plants in the Amargosa Valley Planning Area. Domestic wastewater is disposed through septic tanks and leach fields.

3.9.4.4 Solid Waste

The NDEP, Bureau of Waste Management oversees the permitting of solid waste landfills and other waste management facilities within the state of Nevada. The nearest Class I landfill is the Pahrump Valley Landfill located north of Pahrump, east of Highway 160.

3.9.4.5 Schools

The proposed Project is located within the Nye County School District of Nye County. There are four schools that serve the Amargosa Valley. There are three public schools and one private school. Horizon Academy is a special learning center for which students from other schools must apply independently. A summary of school information and enrollment for the schools is provided in Table 3-25.

Table 3-25 Summary of Schools in the Nye County School District

District	Schools	Grades Provided	Number of Students for 2008-2009 School Year	Location of School
Nye	Beatty School	K-8	103	Beatty
	Amargosa School	K-8	194	Amargosa Valley
	Beatty High School	9-12	139	Beatty
Private	Horizon Academy	7-12	129	Amargosa Valley
Source: Nye County School District 2009; Nevada Department of Education 2009				

3.9.5 Fiscal Resources

Clark County: There are 90 funds which Clark County uses for its operations. Table 3-26 shows the total revenues, by category, associated with the overall Clark County budget and the General Fund at the end of the 2007-2008 fiscal year. A blank cell with no financial information indicates that the revenue source did not contribute to the county fund. The significant revenue sources for these funds are intergovernmental resources (46 percent), property taxes (25 percent), and licenses and permits (10 percent).

Table 3-26 Clark County Revenues: 2007-2008

Revenue	Overall	General Fund
Property Taxes	791,005,569	331,089,911
Other Taxes	66,010,096	14,341,093
Licenses and Permits	316,607,676	219,886,318
Intergovernmental Resources	1,422,232,908	330,571,827
Charges for Services	166,789,048	60,653,236
Fines and Forfeits	26,708,031	24,644,256
Special Assessments	37,236,673	-
Miscellaneous	291,483,804	136,016,587
Total Revenues	**3,118,073,805**	**1,036,753,592**
Source: Clark County, 2009		

Table 3-27 shows the expenditures for the 2007-2008 fiscal year (July 1 through June 30). Public safety and public works comprise the largest expenditure items within Clark County.

Table 3-27 Clark County Expenditures for Fiscal Year 2007-2008	
Expense	
Current:	
General Government	224,829,526
Judicial	187,097,471
Public Safety	1,048,734,667
Public Works	576,499,730
Health, Welfare, and Sanitation	326,872,672
Culture and Recreation	82,728,864
Community Support	13,127,241
Intergovernmental Expenditures	114,566,225
Debt Service:	
Principal	110,892,600
Interest	122,112,389
Interest Cost\Fiscal Charges	78,169,949
Total Expenditures	**2,885,631,334**
Difference Between Revenue (Table 3-26) and Expenditures (Table 3-27)	232,442,471
Source: Clark County 2009.	

Nye County: The Nye County Finance Department describes county governmental revenues and expenditures within 5 major funds and approximately 67 non-major funds. The General Fund is the primary operating fund for Nye County (Nye County 2009). Table 3-28 and Table 3-29 summarize the Nye County revenues and expenditures, respectively. Blank cells indicate that the relevant revenue source did not contribute to the county fund, or the fund did not pay for the relevant expense in Fiscal Year 2007-2008.

Table 3-28 Nye County Revenues: 2007-2008

Revenue	General Fund	Education Endowment Fund	Special Project Fund	Endowment Capital Projects Fund	Repository Oversight Fund	Overall Total incl Non-major Funds
Taxes	14,944,493	-	-	-	-	**20,545,682**
Licenses	135,133	-	-	-	-	**1,956,669**
Intergovernmental	14,066,342	-	11,250,000	-	3,343,065	**38,713,071**
Charges for Services	2,646,579	-	-	-	-	**4,690,031**
Fines and Forfeits	403,155	-	-	-	-	**678,477**
Other	1,445,393	612,796	1,068,554	719,162	-	**7,759,128**
Total Revenues*	**33,691,095**	**612,796**	**12,318,554**	**719,162**	**3,343,065**	**74,343,058**

* Information taken directly from Nye County (2009), inconsistencies have been noted.

Table 3-29 Nye County Expenditures for Fiscal Year 2007-2008

Expenditure	General Fund	Education Endowment Fund	Special Project Fund	Endowment Capital Projects Fund	Repository Oversight Fund	Overall Total incl Nonmajor Funds
General Government	12,342,734	-	540,064	-	3,343,065	**20,853,997**
Judicial	6,152,895	-	-	-	-	**6,464,099**
Public Safety	15,614,299	-	20,317	-	-	**19,225,464**
Public Works	114,738	-	355,310	-	-	**9,146,041**
Health and Sanitation	250,306	-	-	-	-	**1,133,407**
Welfare	-	-	-	-	-	**1,616,136**
Culture and Recreation	-	-	35,586	-	-	**413,651**
Community Support	392,940	-	476	-	-	**890,075**
Intergovernmental	298,900	1,119,264	841,088	-	-	**3,526,569**
Capital Projects	-	-	4,208,966	-	-	**5,863,564**

Table 3-29 Nye County Expenditures for Fiscal Year 2007-2008						
Expenditure	**General Fund**	**Education Endowment Fund**	**Special Project Fund**	**Endowment Capital Projects Fund**	**Repository Oversight Fund**	**Overall Total incl Nonmajor Funds**
Debt Service:						
Principal	-	-	-	-	-	**2,183,241**
Interest	-	-	-	-	-	**436,848**
Total Expenditures	**35,166,812**	**1,119,264**	**6,001,807**	-	**3,343,065**	**71,753,092**
Difference Between Revenue (Table 3-28) and Expenditures (Table 3-29)	(1,475,717)	(506,468)	6,316,747	719,162	0	**2,589,966**
Source: Nye County 2009						

3.10 Environmental Justice

On February 11, 1997, Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) was enacted. This act requires all federal agencies to assess whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority and low-income populations in the United States.

The EPA defines a community with potential environmental justice (EJ) populations as one that has a greater percentage of minority or low-income populations than does an identified reference community. Minority populations are those populations having (1) 50 percent minority population in the affected area or (2) a significantly greater minority population than the reference area (Executive Order 12898). The EPA has not specified what percentage of the population can be characterized as "significant" in order to define EJ populations. Low-income populations were defined as those individuals that are considered living below poverty levels. The poverty guidelines are updated periodically in the *Federal Register* by the U.S. Department of Health and Human Services under the authority of 42 U.S.C. 9902(2). Poverty thresholds are used mainly for statistical purposes – for instance preparing the estimates of the number of Americans in poverty for each year's report. For example, for a four-person family unit with two children, the 2008 poverty threshold is $21,834. For a one- or two-person family unit, the poverty thresholds vary by age; the 2008 threshold for one individual under age 65 is $11,201, whereas for an individual 65 or over it is $10,326 (Institute for Researeh on Poverty 2009).

The U.S. Census Bureau has no specific designation for the Town of Amargosa Valley. Therefore, the EJ analysis is undertaken at the U.S. Census Block Group level, which allows an assessment of both poverty and minority populations. Within 5 miles of the Project area, there are two Block Groups which extend much farther than the 5-mile radius of the Project area; one

in Nevada and one in California (Figure 3-12). The Block Group in California has no population within 5 miles of the Project area and thus was not used in the analysis. The Nevada Block Group encompasses 528 square miles and had a 2000 population of 1,176.

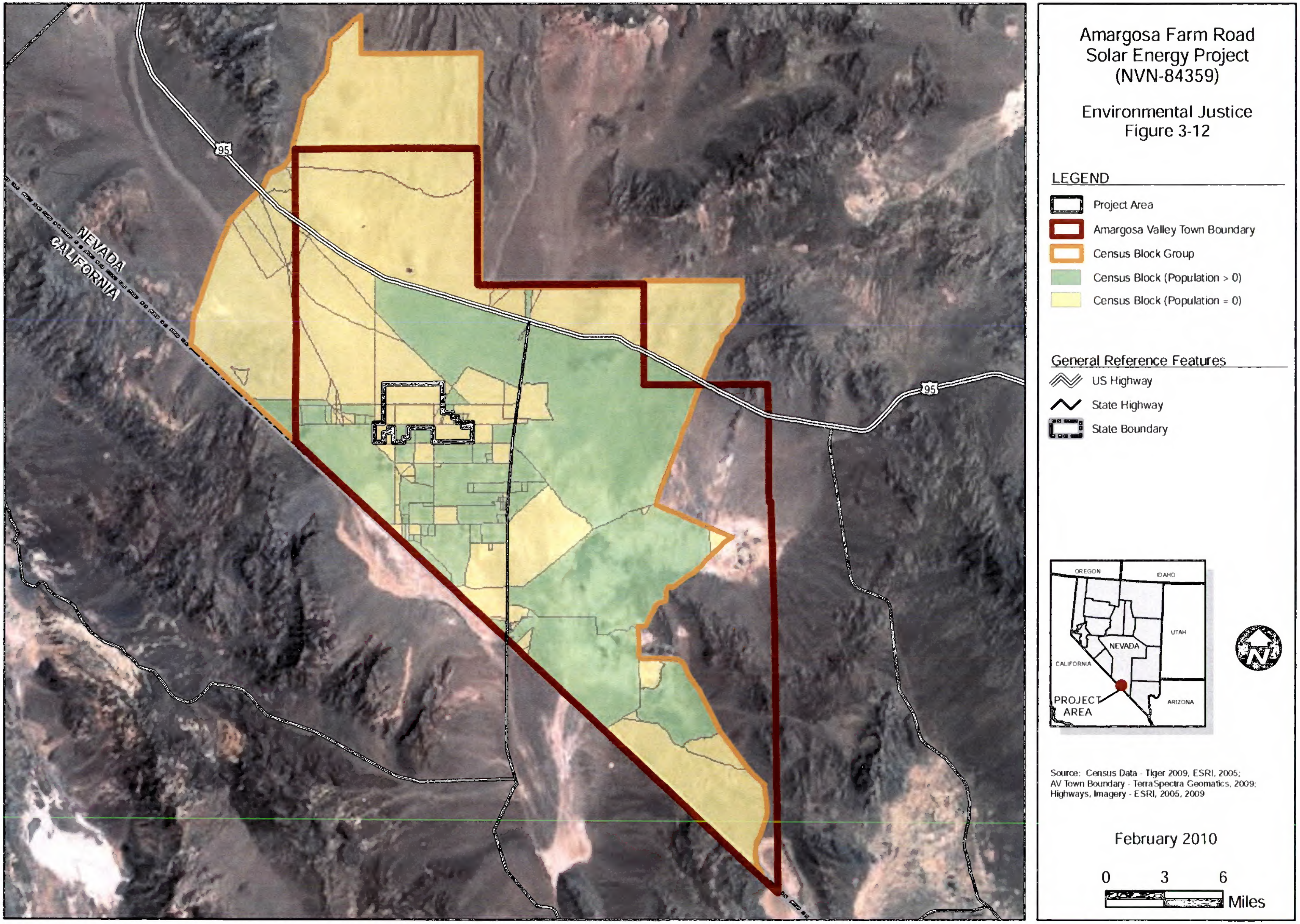
The reference areas are Nye County and the State of Nevada, which are larger geographic areas with which to compare the Census Block Group. Relevant ethnicity data and poverty level for the Census Block Group was used to determine whether populations residing within the affected area constitute a potential EJ population. This was done by comparing minority and poverty level statistics for the Block Group with those reported for Nye County and the State of Nevada. The data used for comparison was from the 2000 Census.

A potential EJ population is determined to exist in a Census Block Group if the minority population (e.g., a non-white population) is more than 10 percentage points higher than the minority population within one of the reference communities (Nye County or the State of Nevada). Table 3-30 summarizes these racial proportions for the referenced groups. As shown in Table 3-26, the minority population in the Amargosa Valley Block Group is 20.7 percentage points higher than that in Nye County and 1.2 percentage points higher than that in Nevada. The majority of the minority population in the Block Group is classified as Hispanic. The percentage of the population below poverty level in the Block Group is 4.1 and 4.3 percentage points higher than that in Nye County and Nevada respectively.

Table 3-30 Racial Proportions Summary

	Nevada	Nye County	Block Group
Total Population	1,998,257	32,485	1,181
White	1,303,001	27,511	753
Hispanic	393,970	2,713	360
African American	131,509	373	1
American Indian	21,397	587	58
Asian	88,593	242	8
Pacific Islander	7,769	100	1
Other	2,787	68	NA
Mixed	49,231	891	NA
Percentage Minority	34.8	15.3	36.0
Percentage Below Poverty Level	10.5	10.7	14.8

Source: U.S. Census Bureau 2009



Amargosa Farm Road Solar Energy Project (NVN-84359)

Environmental Justice Figure 3-12

February 2010

3.11 Land Use, Recreation, Transportation and Access

This section of the EIS characterizes the existing and future land use, recreation, access, and transportation conditions within the ROI. The ROI area varies by resource area. The ROI for land use includes the Town of Amargosa Valley planning area, located in the south-central part of Nevada in Nye County, and covers approximately 505 square miles of rural, unincorporated desert land. The ROI for the transportation and access information encompasses a broader area, including Nye and Clark counties in Nevada, with an emphasis on the communities closest to the Project area, including Amargosa Valley and Beatty, as well as larger communities within 2 hours of the Project area, such as Las Vegas and Pahrump. For recreation resources, the ROI encompasses a radius of approximately 50 miles around the Project area, based on the visual resources ROI, which accounts for all areas within the viewshed of the Project area.

3.11.1 Regulatory Framework

The primary legal basis for granting a permit on BLM land is Section 302 of the FLPMA. Under the FLPMA, the Secretary of the Interior is authorized to grant, issue, or renew rights-of-way over, upon, or through such land for utility corridors, roads, trails, highways, railroads, canals, etc. The FLPMA provides the BLM with authority to issue leases and permits for the use, occupancy, and development of public land. The regulations establishing procedures for the processing of these leases and permits are found in 43 CFR 2920.

The following are the federal, state, regional, and local planning documents applicable to the proposed Project:

BLM Las Vegas RMP and Final EIS (1998) – This plan identifies existing and future management direction in the form of objectives and management for 3.3 million acres of public land in Clark and Nye counties, located in southern Nevada. All public land within the planning area, unless otherwise classified as ACEC or Wilderness Study Areas, is available for land use leases and permits under Section 302 of the FLPMA. Land use lease or permit applications are addressed on a case-by-case basis, where consistent with other resource management objectives and local land uses.

Per the BLM planning process, Recreation Opportunity Spectrum (ROS) classifications are used to help set recreation themes within each of the BLM management areas. The entire ROI occurs within the Roaded Natural category. The Roaded Natural designation is given to areas typically characterized by a natural environment with moderate evidence of humans. Activities include semi-primitive Motorized opportunities, with the addition of picnicking, rock collecting, wood gathering, interpretive use, rustic resorts, and organized camps (BLM 2008).

Nye County Comprehensive Plan (Nye County Board of Commissioners 1994) – This plan was developed to protect the health, welfare, and economic well being of the County by creating management objectives for the effects of population growth and decline, and to serve as a framework for local land use plans. It is Nye County's objective to establish long-term partnerships with the renewable energy sector, and has goals to:

- Support and encourage the efficient use of energy
- Promote the siting of renewable energy research or pilot technology and demonstration projects in Amargosa Valley
- Become proactively involved in the federal and state efforts to route and approve renewable energy transmission corridors for distributing power from the Amargosa Valley to the national grid

Amargosa Valley Area Plan (Amargosa Valley Area Plan Committee 2009) – This plan was developed to manage the community's natural resources and provide public services and facilities while protecting the public health, safety, and welfare.

3.11.2 Data Collection and Methods

Existing land use and recreation data were collected through analysis of aerial photography, field verification, review of existing studies and plans, and coordination with local and county agencies. Individuals from the BLM were contacted and the BLM Legacy Rehost (LR2000) database was utilized to verify recreation and land use resources on BLM land within the ROI.

Planned land use and recreation information was collected through review of existing plans for the Amargosa Valley and the BLM. Local, county, and federal agencies were contacted to identify potential or approved developments near the proposed Project.

It is important to note that land jurisdiction does not necessarily imply land ownership; however, in some cases the authority that has jurisdiction may also own the land. Three categories of land ownership were identified and mapped within the land use ROI: federal, local, and private. This information was obtained from available maps, planning documents, and discussions with agencies (Figure 3-13).

3.11.3 Existing Land Use

Existing land use conditions within the ROI are characterized primarily by open desert, utility corridors and facilities, limited industrial (mining and dairy) and commercial development, agriculture, and scattered low-density residences (Figure 3-14).

As described in Section 3.9 – Socioeconomic Resources, approximately 97 percent of Nye County's land area is administered by the federal government.

The BLM is the largest landowner in the ROI. The Southern Nevada District, Pahrump Field Office manages 3.3 million acres of public land in southern Nevada and 700,000 acres in southern Nye County, including the land requested under the Proponent's right-of-way application for the proposed Project. Per the 1998 Las Vegas RMP/EIS, these lands are available for multiple uses, including opportunities for recreation, utility development, mining, wildlife habitat, grazing, and wilderness preservation. The proposed Project conforms to the intent of the 1998 Las Vegas RMP/EIS (BLM 1998).

Varieties of leases, easements, and rights-of-way have been granted by the BLM on land they manage within the ROI. Table 3-31 lists those that have been authorized or are pending within a 2-mile buffer around the Project area.

The 1998 Las Vegas RMP/EIS identified 28,257 acres of land in the ROI available for disposal, which means these lands are available for sale, exchange, or recreation and public expansion and development (BLM 1998). Currently, there are approximately 27,904 acres of disposal land within the ROI. All BLM-managed land requested under the Proponent's right-of-way application is land that has been designated for disposal.

There is no state-owned land within the ROI. The nearest state-owned land is the Belmont Courthouse State Historic Park in northern Nye County, approximately 170 miles away. Within the ROI, a few state-owned facilities are present, including an NDOT-managed rest area at the intersection of US 95 and NV 373. Private land within the ROI includes isolated pockets of residential and commercial development within the Amargosa Valley.

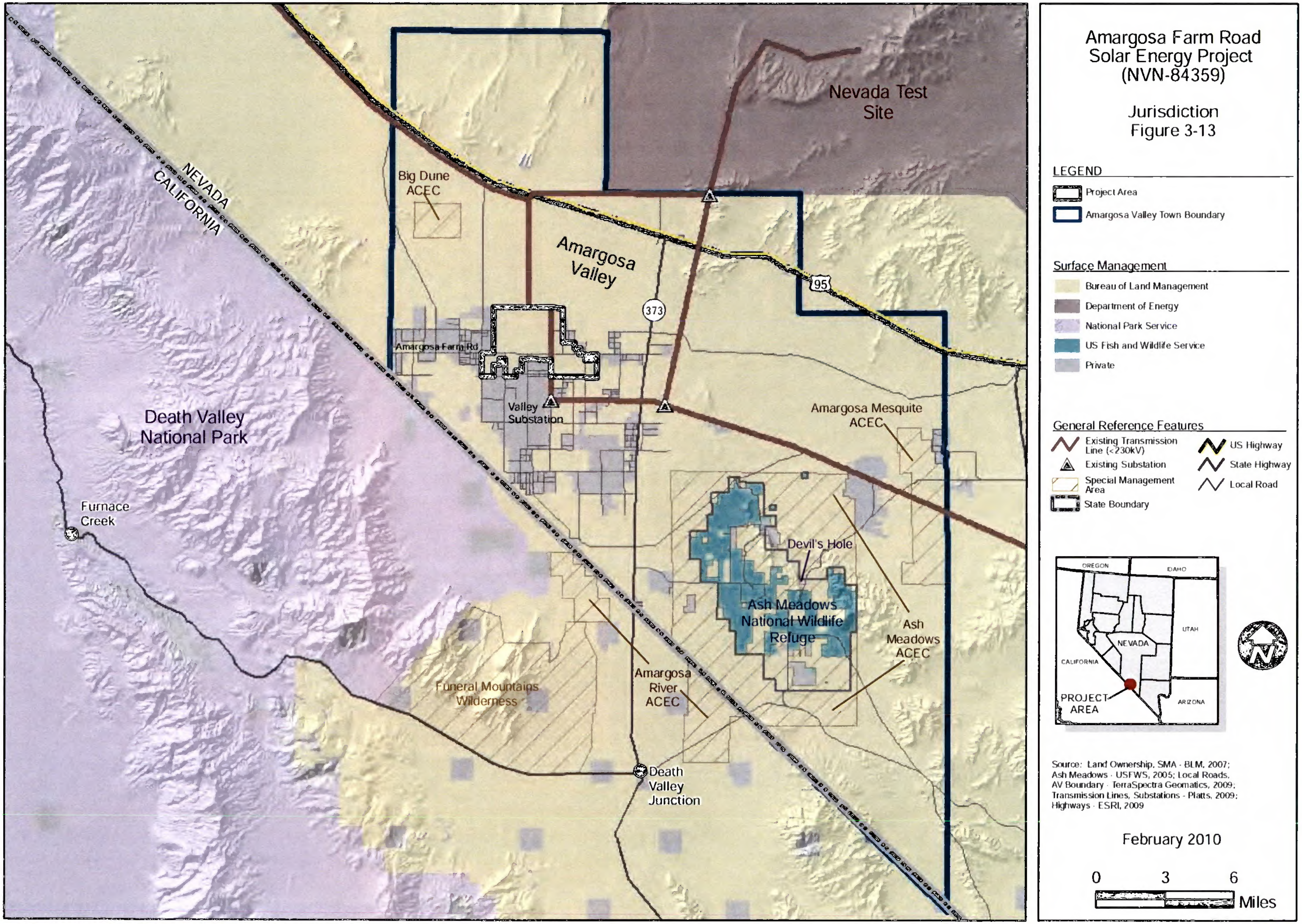
There are no incorporated cities or towns within the ROI or Nye County. The Project area is located in the unincorporated Town of Amargosa Valley, which consists of a rural population of roughly 1,500 people, spread over a large geographic area of approximately 505 square miles. While the BLM has exclusive jurisdiction over land use activities on land that it manages, the Amargosa Valley Area Planning Commission provides guidance to ensure that proposed projects within the Town Planning boundary are constructed and operated in a manner that is consistent with the standards set forth in the Amargosa Valley Area Plan (Amargosa Valley Area Plan Committee 2009).

3.11.3.1 Residential

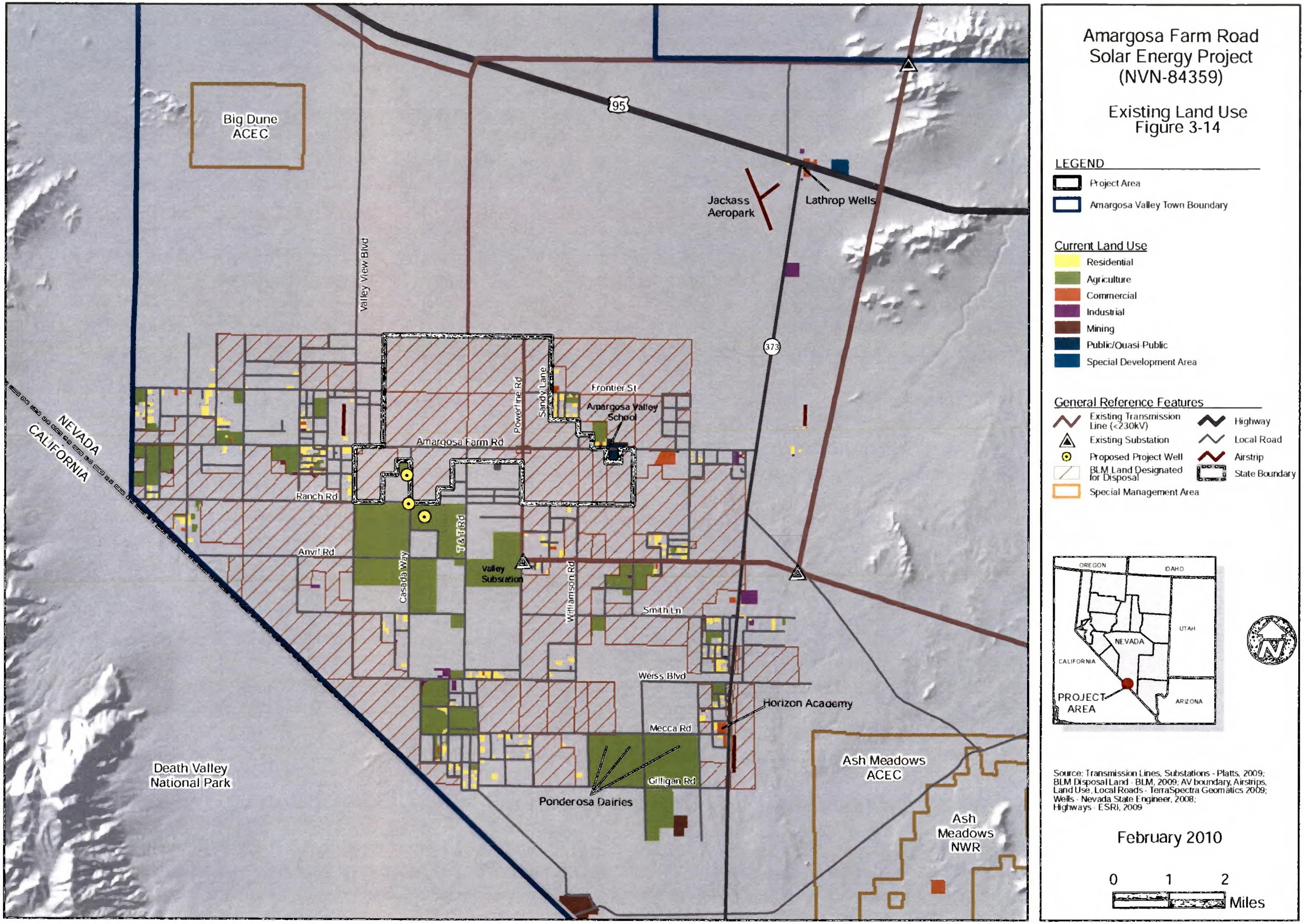
Residential development in the ROI includes isolated homesteads scattered throughout the Amargosa Valley. According to the Nye County Assessors database, there are approximately 600 parcels of residentially zoned private properties within 2 miles of the Project area, generally to the south and east. Concentrated population areas near the Project site include an area east of Sandy Lane, approximately 0.25 mile east of the Project area; and an area west of Valley View Road along Amargosa Farm Road.

3.11.3.2 Commercial and Quasi-Public

There is limited commercial development within the Amargosa Valley. The closest commercial development is located approximately 6 miles northeast of the Project area at the intersection of NV 373 and US 95. It includes a business park, the Nevada Joe's commercial complex (containing a restaurant, brothel, and convenience store), a fireworks retailer, gas station, helicopter pad, and a materials-laydown yard leased by the Nye County Nuclear Waste Repository Project Office.



Amargosa Farm Road
Solar Energy Project
(NVN-84359)
Jurisdiction
Figure 3-13
LEGEND
Project Area
Amargosa Valley Town Boundary
Surface Management
Bureau of Land Management
Department of Energy
National Park Service
US Fish and Wildlife Service
Private
General Reference Features
Existing Transmission Line (<230kV)
Existing Substation
Special Management Area
State Boundary
US Highway
State Highway
Local Road
OREGON
IDAHO
UTAH
NEVADA
CALIFORNIA
ARIZONA
PROJECT AREA
Source: Land Ownership, SMA - BLM, 2007; Ash Meadows - USFWS, 2005; Local Roads, AV Boundary - TerraSpectra Geomatics, 2009; Transmission Lines, Substations - Platts, 2009; Highways - ESRI, 2009
February 2010
0
3
6
Miles
Nevada Test Site
Big Dune ACEC
Amargosa Valley
NEVADA
CALIFORNIA
95
373
Amargosa Farm Rd
Valley Substation
Amargosa Mesquite ACEC
Death Valley National Park
Furnace Creek
Devil's Hole
Ash Meadows National Wildlife Refuge
Ash Meadows ACEC
Funeral Mountains Wilderness
Amargosa River ACEC
Death Valley Junction



Amargosa Farm Road
Solar Energy Project
(NVN-84359)
Existing Land Use
Figure 3-14
LEGEND
Project Area
Amargosa Valley Town Boundary
Current Land Use
Residential
Agriculture
Commercial
Industrial
Mining
Public/Quasi-Public
Special Development Area
General Reference Features
Existing Transmission Line (<230kV)
Existing Substation
Proposed Project Well
BLM Land Designated for Disposal
Special Management Area
Highway
Local Road
Airstrip
State Boundary
OREGON
IDAHO
UTAH
NEVADA
CALIFORNIA
ARIZONA
PROJECT AREA
Source: Transmission Lines, Substations - Platts, 2009; BLM Disposal Land - BLM, 2009; AV boundary, Airstrips, Land Use, Local Roads - TerraSpectra Geomatics 2009; Wells - Nevada State Engineer, 2008; Highways - ESRI, 2009
February 2010
0
1
2
Miles
Big Dune
ACEC
95
Jackass
Aeropark
Lathrop Wells
Valley View Blvd
373
Frontier St
Sandy Lane
Powerline Rd
Amargosa Valley
School
Amargosa Farm Rd
Ranch Rd
NEVADA
CALIFORNIA
Anvil Rd
Casada Way
T&T Rd
Valley
Substation
Williamson Rd
Smith Ln
Weiss Blvd
Horizon Academy
Mecca Rd
Gilligan Rd
Ponderosa Dairies
Death Valley
National Park
Ash Meadows
ACEC
Ash
Meadows
NWR

Table 3-31 Authorized and Pending Rights-of-Way Granted		
Serial Number	**Status**	**Description**
NVN 52385	Authorized	Amargosa Community Pit – Sand and Gravel Facility
NVN 62888	Authorized	Right-of-way – FLPMA, Non-Energy Facilities
NVN 78483	Authorized	Free Use Permit – Government – Sand and Gravel
NVN 83205	Authorized	Min Mat Negotiated – Sand and Gravel
NVN 83276	Pending	Mine/Reclamation Plan, Min Mat Negotiated – Sand and Gravel
NVN 84623	Authorized	Min Mat Negotiated – Sand and Gravel
NVN 85746	Pending	Desert Research Institute Wind Measurement Sites, right-of-way – Power Transmission – FLPMA, Wind Energy Facilities
NVN 87822	Pending	Min Mat Negotiated – Sand and Gravel, S&G LCS
NVN 35976	Authorized	Sale – Sec 209 Min FLPMA
NVN 48876	Authorized	Access Road (2,640' x 40') Right-of-way – Road, Non-Energy Facilities
NVN 53354	Authorized	Amargosa Valley Road, Right-of-way – Road, Non-Energy Facilities
NVN 61968FD	Pending	Segregation Outside LV Valley, EX – BLM Sec 206, FLPMA
NVN 73706	Authorized	Nevada Bell, Right-of-way – Tel & Teleg, FLPMA
NVN 85654	Pending	Cogentrix Solar transmission line right-of-way application overlapping existing right-of-way (NVN-84359)
NVN 66289	Authorized	Ely to Cherry Creek right-of-way – Tel & Teleg, FLPMA, fiber optic facilities
NVN 84466	Pending	Pacific Solar Investments, 300 MW solar trough site called Amargosa South
NVN 85657	Pending	Cogentrix Solar Services, Solar thermal Energy Facility Amargosa Valley Big Dune overlapping existing right-of-way (NVN 84466)
NVN 83150	Pending	Cogentrix Solar Services 1,400 MW CSP Trough Right-of-way
Source: BLM and USFS 2009		

The Amargosa Valley Community Complex mixed-use community area is located adjacent to Amargosa Farm Road immediately southeast of the Project area. It includes public facilities: an emergency services center (fire department, ambulance service, helipad, and sheriff's substation), library, medical clinic, senior center, park, cemetery, rodeo grounds, AVIA Community Center and Raceway, and the Amargosa Valley School.

A mixed-use commercial area is located adjacent to NV 373 and Mecca Road, approximately 3 miles southeast of the Project area: Horizon School complex (boarding school with associated residences), a grocery store, First International Bank, and pizza restaurant.

Two commercial institutions, the Longstreet Hotel and Casino and the State Line Saloon complex (contains a restaurant, RV park, golf course, convenience store, and lounge with gambling) are located 8 miles southeast of the Project area on the Nevada/California border, east and west of NV 373.

Two churches are located in the ROI: the Church of Amargosa located on Amargosa Farm Road and an unknown church located off Maverick Road. Both are located approximately 0.5 mile west of the Project area.

3.11.3.3 Industrial and Agricultural

There is limited industrial development in the ROI. The Ponderosa Dairy, a large dairy operation employing approximately 120 employees, is located roughly 2 miles south of the Project area.

Within the Amargosa Valley, the principal crop grown is alfalfa, which supports the local dairy operations. Other crops include fruits and vegetables, and nut trees (primarily pistachios).

3.11.3.4 Communication Facilities

Three cellular towers are located within the Amargosa Valley Community Complex: one adjacent to the senior center and two located at the emergency services building. There are three Internet provider towers in the local area. The towers are located adjacent to the dairy, adjacent to the health clinic complex, and southwest of the Project area on T&T Road (per personal communication with Jan Cameron, December 16, 2009).

3.11.3.5 Air Facilities

Three private airstrips are located within the Amargosa Valley. One at Mecca Road alignment and NV 373; one on the east side of NV 373 at the Amargosa Farm Road alignment, and off of Valley View Boulevard; and one the north side of Amargosa Farm Road. The nearest major airport to the Project area is McCarran International Airport, located approximately 3 hours east, in Las Vegas, Nevada.

An abandoned airstrip, formerly Jackass Aeropark, is located approximately 5 miles northeast of the Project area, west of the intersection of US 95 and NV 373.

3.11.3.6 Utilities

The Project area is located approximately 2 miles north of the Valley Electric Association-owned Valley Substation. A 115 kV distribution line traverses north, paralleling Powerline Road to US 95. Two other distribution lines are located on the eastern edge of the Project area, including a distribution line owned by Valley Electric, which traverses diagonally from NV 373 to US 95 north of the Project area. Additionally, a telephone/telegraph right-of-way owned by Nevada Bell is adjacent to the western edge of the Project area. The right-of-way runs north from Anvil Road to US 95, and continues in the ROI east on Anvil Road and north on NV 373.

3.11.3.7 Mining/Extraction

There are no active mining claims within the Project area (LR2000). There are three active mineral-resource-extraction areas approximately 5 miles from the Project area. Two of these areas are industrial mineral mines with processing plants for cinder and specialty clay products. The location of these mining areas is shown on Figure 3-3.

IMV Nevada mines and processes a variety of specialty clays, approximately 5 miles south of the Project area, south of Anvil Road near School Lane. Currently, IMV maintains mining claims (the Mud Camp Mining claims in Sections 20, 21, and 29 of T16S R50E) on approximately 10,000 acres in the Amargosa Valley near the Nevada/California border. An exploration plan is maintained and extensive ore reserves are identified for future production. From the mine locations, specialty clays are processed at the plant in Section 29 of T17S R49E. A number of products are made using the clays for a wide variety of uses in industrial, construction, and agricultural applications.

Cinder Cone Mine, owned and operated by Cind-R-Lite Block, holds a series of public and private claims for volcanic-mineral materials, such as pumice and cinder. These claims are located in Section 36 of T14S, R48E, 9 miles north of the Project area and north of US 95.

The third area contains claims filed by the Nye County Road Department, which operates a sand and gravel pit that occupies Section 10 of T15S R49E.

3.11.4 Planned Land Use

Planned, or future land use refers to the future land uses designated within the ROI federal (BLM) and local (Amargosa Valley Area Plan) jurisdictional entities' plans. These land management plans reflect the goals and policies that guide the physical land development. Under the guidance of the 1998 Las Vegas RMP/EIS, a total of 27,904 acres of established land disposal areas on BLM land in the ROI and surrounding vicinity are currently available for transfer through sale or lease to other uses (BLM 1998). With the development of the proposed Project, approximately 7,000 fewer acres would be available for BLM disposal to other federal actions.

In the ROI, which is outside of the Pahrump Regional Planning District, the County does not provide official guidance for new developments. Based on relevant planning documents for the

jurisdictions present in the ROI, the overall land uses, types, patterns, and densities therein are not expected to change substantially (Figure 3-15).

The Amargosa Valley Area Plan (Amargosa Valley Area Plan 2009) limits parceling in the ROI to a minimum of 2 acres for the Low Density Residential land use designation; and to 5 acres for the Rural Density Residential land use designation outside specified higher density areas on the perimeter of the planning area boundary. It also shows a specification of a 0.25-mile Open Space, Parks & Trails land use designation between residential areas and the area where the proposed Project is located.

Future land uses shown for the ROI include Special Development Areas (SDA), rural density residential, open space, parks & trails, a school, proposed museum and technology park, landfills and utility facilities. The term SDA is a mixed-use designation to set aside public or private areas where a variety of land uses might be proposed for approval, including projects under review by the BLM, such as Solar Energy Facilities (Amargosa Valley Area Plan Committee 2009). Nye County's resolution to adopt the plan:

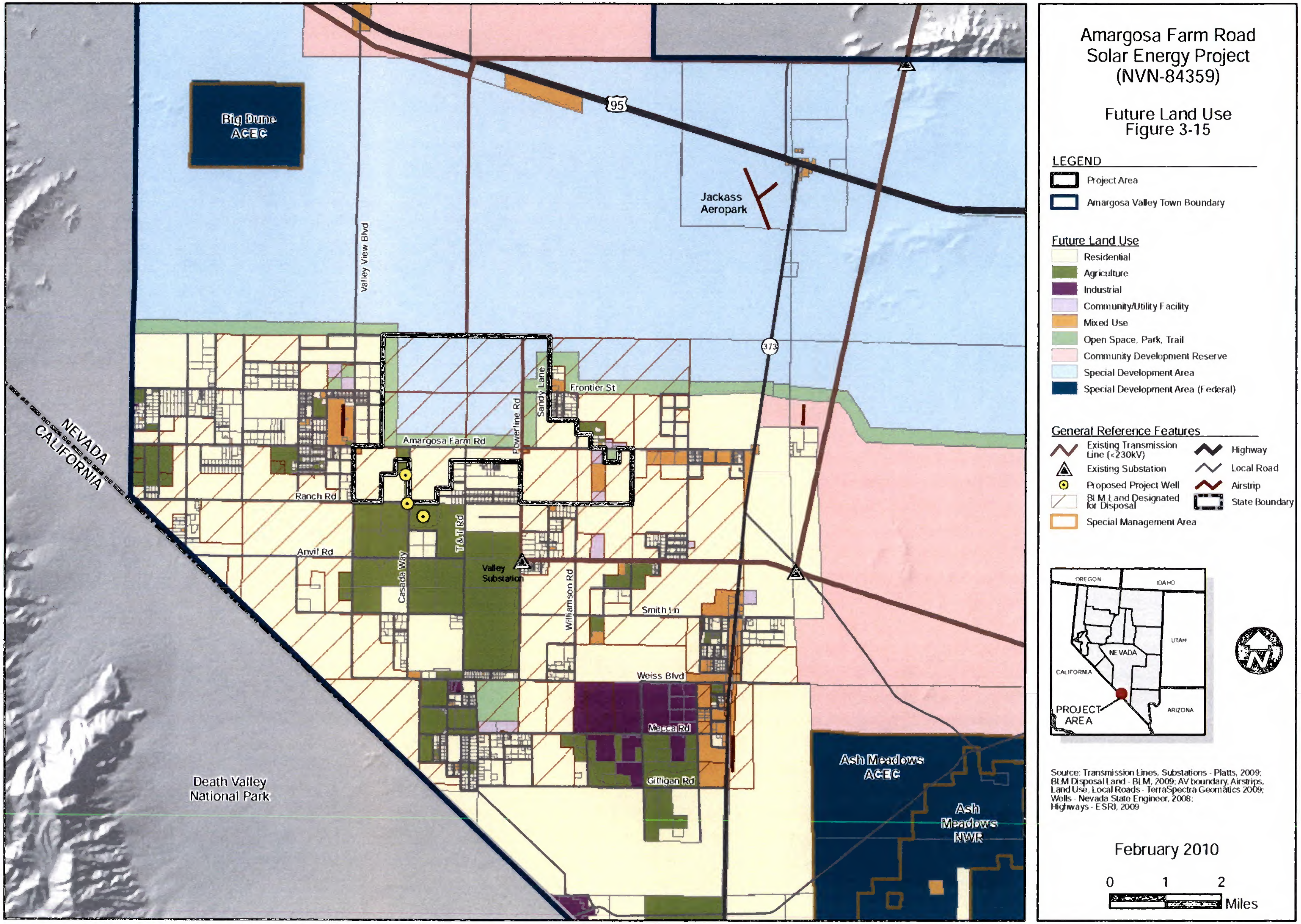
"...is a guide toward future land use decisions over the next 20 years, without restricting private property rights or limiting the right to enter into any development agreements. The U.S. Bureau of Land Management would have to consider the plan when making decisions." (Waite 2009)

3.11.5 Recreation

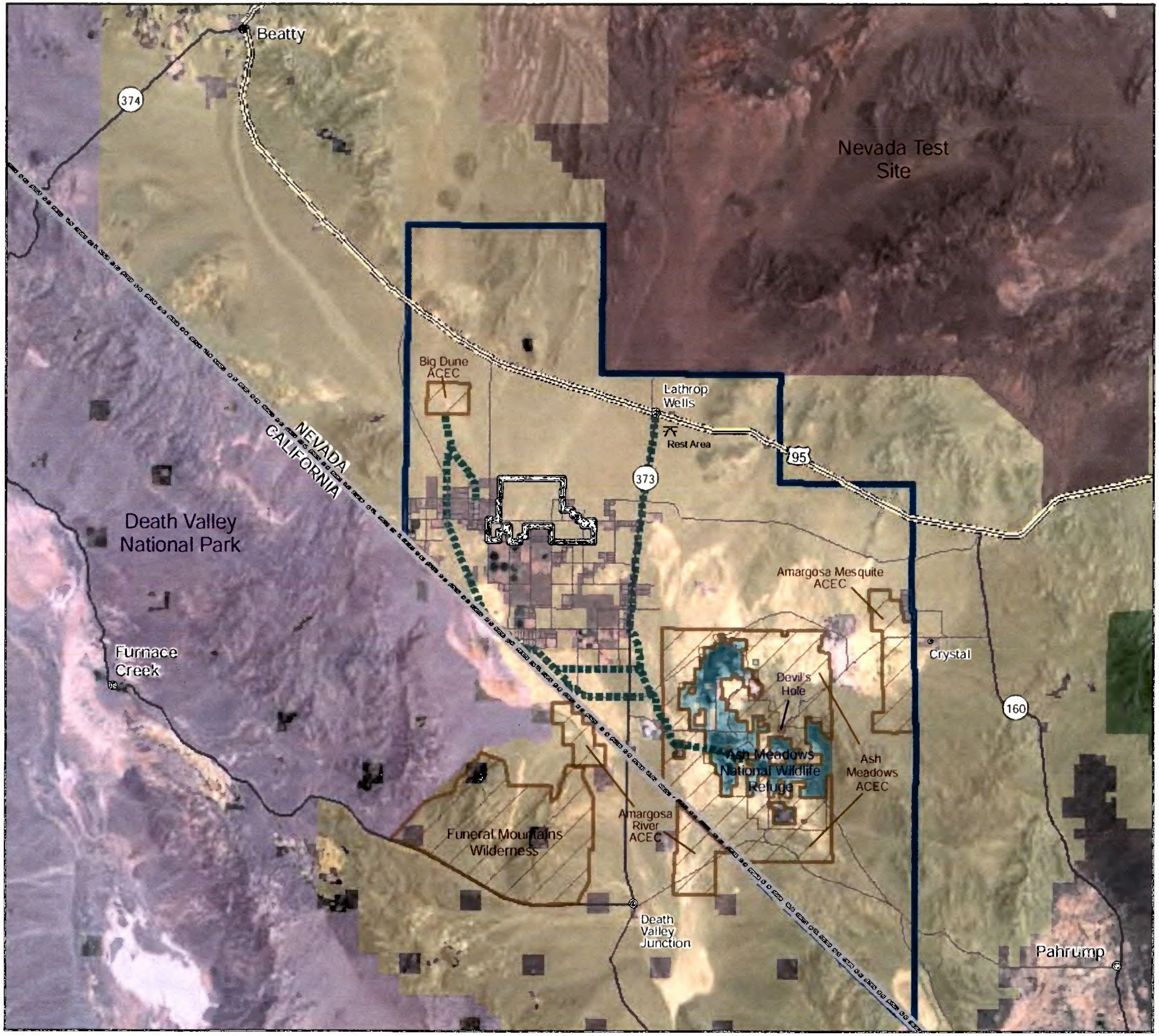
For recreation resources, the ROI encompasses a radius of approximately 50 miles around the Project area. The 50-mile radius includes the mountains and valleys surrounding the Amargosa Valley, extending into the Death Valley National Park in California. The mountains and deserts surrounding the Project area offer a variety of dispersed recreation: using OHV in the Big Dune area and on existing roads and dry washes; big and small game hunting in the surrounding desert and mountains; and hiking, camping, and sightseeing in the Funeral Mountains and other accessible areas (Figure 3-16).

3.11.5.1 Special Management Areas

Big Dune, a unique sand dune area approximately 4 miles northwest of the Project area, is one of the more popular recreational areas in the ROI. The BLM manages this area primarily as an OHV recreation area, and as an ACEC for several sensitive beetle species. Other recreational opportunities include wildlife viewing, photography, and sandboarding and sandskiing on open dunes. The Big Dune recreational area is accessed primarily from Valley View Road approximately 2 miles south of US 95. Developed facilities include a parking and vending area. Dispersed camping areas on the east and west sides of the dune is available as well. A Recreation Management Plan for the 1,920-acre area is being developed by the BLM.



Amargosa Farm Road Solar Energy Project (NVN-84359)
Future Land Use
Figure 3-15
LEGEND
Project Area
Amargosa Valley Town Boundary
Future Land Use
Residential
Agriculture
Industrial
Community/Utility Facility
Mixed Use
Open Space, Park, Trail
Community Development Reserve
Special Development Area
Special Development Area (Federal)
General Reference Features
Existing Transmission Line (<230kV)
Existing Substation
Proposed Project Well
BLM Land Designated for Disposal
Special Management Area
Highway
Local Road
Airstrip
State Boundary
OREGON
IDAHO
NEVADA
UTAH
CALIFORNIA
ARIZONA
PROJECT AREA
Source: Transmission Lines, Substations - Platts, 2009; BLM Disposal Land - BLM, 2009; AV boundary, Airstrips, Land Use, Local Roads - TerraSpectra Geomatics 2009; Wells - Nevada State Engineer, 2008; Highways - ESRI, 2009
February 2010
0
1
2
Miles
Big Dune ACEC
95
Jackass Aeropark
Valley View Blvd
373
Sandy Lane
Frontier St
Powerline Rd
Amargosa Farm Rd
NEVADA
CALIFORNIA
Ranch Rd
T&T Rd
Anvil Rd
Casada Way
Valley Substation
Williamson Rd
Smith Ln
Weiss Blvd
Mecca Rd
Gilligan Rd
Death Valley National Park
Ash Meadows ACEC
Ash Meadows NWR



Amargosa Farm Road Solar Energy Project (NVN-84359)

Recreation and Transportation
Figure 3-16

LEGEND

Project Area
Amargosa Valley Town Boundary

Surface Management

Bureau of Land Management
Department of Energy
National Park Service
US Fish and Wildlife Service
Private

General Reference Features

US Highway
State Highway
Local Road
Rest Area
Future Trail / Recreation Corridor
Special Management Area
State Boundary

Source: Land Ownership, SMA - BLM, 2007; Trails, Local Roads, AV Boundary - TerraSpectra Geomatics, 2009; Transmission Lines, Substations - Platts, 2009; Ash Meadows - USFWS, 2005; Highways - ESRI, 2009

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0 4 8 Miles

The Ash Meadows NWR, managed by the USFWS, is located approximately 7 miles southeast of the Project area. Ash Meadows is a unit of the Desert Refuge Complex, which protects and manages valuable ecosystems in the Southwest. The Comprehensive Conservation Plan for the Desert NWR Complex provides guidance for the Refuge and ensures public involvement in management decisions (USFWS 2009b). The Ash Meadows unit includes a variety of recreational opportunities and facilities and includes Devils Hole, a detached unit of the NPS Death Valley National Park, which is managed as a wildlife refuge to an endangered species of pupfish. Encompassing over 23,000 acres of spring-fed wetlands, it contains a rare desert wetland ecosystem that provides habitat for 25 endangered or threatened species found only at Ash Meadows. Recreation opportunities include: hunting, boating, hiking, wildlife observation, environmental education, and photography. Facilities include a visitor center, boat launch, and picnic area, all of which are accessible by NV 373.

The Ash Meadows ACEC's 37,152 acres surround the Ash Meadows NWR. The ACEC is located approximately 5 miles southeast of the Project area and is managed for special status species habitat.

The Amargosa Mesquite ACEC is located approximately 12 miles east of the Project area and is managed for the neotropical bird habitat within its 6,891 acres.

South of the Nevada/California border, the Amargosa River ACEC encompasses 21,552 acres in three distinct geographic units, and are located in northeastern San Bernardino and southeastern Inyo counties, California, near the communities of Tecopa and Death Valley Junction. Eighty-nine percent of the ACEC is on private land, but the BLM has no jurisdiction on private land. Only one of the three separate units in this ACEC is in close proximity to the Project area: the Upper Amargosa Mesquite Bosque Unit, approximately 8 miles south of the Project area, is located west of CA 127 and immediately north of the Funeral Mountains Wilderness. It contains 2,720 areas of public land administered by the BLM. This ACEC contains significant historic and cultural, biological and scenic values centered on the river for which it is named. The Upper unit is considered semi-primitive, with no developed campgrounds or facilities and limited motorized vehicle access. Recreation opportunities include sightseeing, bird and wildlife viewing, and photography. The most common activity is casual use vehicle touring. The Amargosa River ACEC Implementation Plan/Environmental Assessment serves as the guidance document for this ACEC (BLM 2007a).

Also in California, approximately 4 miles southwest of the Project site, is the eastern boundary of the Death Valley National Park. Death Valley National Park covers approximately 5,262 square miles, 95 percent of which is designated as wilderness. Death Valley National Park's recreational opportunities include backcountry road sightseeing, biking, hiking, camping, wildlife observation, and stargazing. There are no developed recreational facilities present for approximately 7 miles into Death Valley National Park from Lee's Camp Road. This road is a common approach for recreational users going into the park from the Amargosa Valley, and is a continuation of Amargosa Farm Road (personal communication with Jan Cameron, December 16, 2009). Echo Canyon Road, a road that requires a 4-wheel-drive vehicle and that the NPS maintains and recommends for a backcountry drive, continues south from Lee's Camp Road into the park. On the southeastern end of Death Valley National Park in Inyo County, within the ROI at approximately 7 miles south of the Project site, is the Funeral Mountain Wilderness Area. The

area encompasses 25,708 acres managed by the BLM Barstow Field Office, and comprises portions of the Funeral Mountains ranging in elevations from 2,200 to 7,000 feet. Recreation opportunities include disbursed hunting, fishing, non-commercial trapping, (unnamed) hiking trails, horseback riding, and camping within the wilderness area and non-vehicular aecess to Death Valley National Park. The Funeral Mountain Wilderness is closed to vehicular traffic, but is open to non-vehicular recreational traffic.

3.11.5.2 Future Recreation

All public land not included within a special management area is managed as an Extensive Recreation Management Area. The objective of these lands is to manage them, emphasizing dispersed and diverse recreation activities (BLM 2008).

The Amargosa Valley Area Plan has designated Open Space, Parks, and Trail corridors parallel to NV 373 east of the Project site, north from Frontier Road to Mojave Road and along Mojave Road west of the Project site (Amargosa Valley Area Plan Committee 2009).

3.11.6 Transportation and Access

The ROI for transportation and access includes Nye and Clark counties in Nevada, with an emphasis on the communities of Amargosa, Beatty, Pahrump, and Las Vegas. US 95 is located approximately 5 miles north of the Project area. Running east and west through the Amargosa Valley, US 95 is the major regional transportation route between Las Vegas and Reno. It serves local travelers between Las Vegas and Beatty and is a major connector route from Las Vegas to points north and west. This principal arterial route is part of the National Highway System, but is maintained by NDOT. The Lathrop Wells Rest Area, maintained by NDOT, is located at the intersection of US 95 and NV 373.

NV 373 (CA 127 in California) is a major rural collector route that runs north and south approximately 3 miles east of the Project area. It is a major travel route to Death Valley National Park from US 95 and a local travel route for residents and travelers within the local community. NV 373 is also a primary travel route to Ash Meadows NWR. Within the ROI, NDOT operates automatic traffic recording data sites along US 95 and NV 373. The 5-year Annual Average Daily Traffic (AADT) for these sites is listed in Table 3-32.

At the eastern extent of the ROI, NV 160 is a regional travel route approximately 18 miles east of the Project area. It is used by residents and travelers to Pahrump and the small community of Crystal, Nevada. NV 160 is also an alternate travel route for recreational visitors to Death Valley National Park and Humboldt-Toiyabe National Forest for eastbound travelers along US 95.

At the western extent of the ROI, NV 374 is a travel route primarily for recreation travelers between Beatty and Death Valley National Park.

Table 3-32 5-Year AADT for the Amargosa Valley Area

Station/Route/Location	2003	2004	2005	2006	2007
Station 0230019 / US 95, Maine St., 1.5 miles south of SR 373 / Death Valley Junction Road	2,800	3,200	2,850	2,900	2,800
Station 0230020 / SR 373, Death Valley Junction Road, 0.5 miles south of US 95	570*	760	560	560*	560
Station 0230021 / US 95, Maine St., 0.2 miles north of SR 373	2,500	2,500*	2,600	2,550	2,600
Station 0230078 / Valley View Road, 0.1 miles west of US 95	100	140	140	160	150
*Data adjusted or estimated					

Within the Amargosa Valley, local access routes provide direct access to local destinations such as commercial, agricultural, and residential areas. Primary transportation corridors (local two-lane roadways) in the ROI include:

- Amargosa Farm Road – A connector road along the southern edge of the Project area. The Proponent is currently working with the Nye County Public Works Department to realign Amargosa Farm Road. Under consideration is the realignment of Amargosa Farm Road either 250 feet or 1,320 feet (0.25 miles) south of its current alignment to follow the southern perimeter of the solar fields.

- Valley View Road – A connector road that connects US 95 to the Amargosa Valley Community. The road is located along the western edge of the Project area. The road is used by residents and recreational users accessing the Big Dune area from the east.

- Powerline Road – A connector road that connects the two main east-west connector roads within the Amargosa Valley. The northerly east-west connector road is the above described Amargosa Farm Road and the second being Mecca Road, which is 5 miles south of Amargosa Farm Road.

Other improved and unimproved local roads in the ROI include Sandy Lane, Frontier Road, Williamson Road, Atomic Road, Barnett Street, Senior Center Road, School Lane, Casada Way, and T&T Road. Numerous improved and unimproved roads follow the section lines and half section lines for access to dispersed agriculture and residential areas throughout the ROI.

3.11.6.1 Future Transportation

The Amargosa Valley Area Plan (Amargosa Valley Area Plan Committee 2009) identifies long-range plans for developing future roadway networks in the Amargosa Valley. The plan identified

multiple extensions and improvements to secondary roads in the ROI, south of the Project area. The extensions would serve to connect the existing street grid south of the Project area, and north to create three additional connections to US 95. The plan also notes that a portion of the abandoned T&T railroad route has the potential to serve the proposed Yucca Mountain Nuclear Waste operation with rail access through a portion of the Amargosa Valley.

3.12 Visual Resources

This section focuses on the inventory of existing visual resources potentially affeeted by the construction, operation, and maintenance of the proposed Project. Based on methods derived from the BLM Visual Resource Management (VRM) System (Manual H-8410-1) (BLM 2007b) and consultation with Las Vegas Field Office VRM staff, the visual resource inventory for the project should include sensitive viewers, scenery, and agency visual management objectives. Additionally, in order to comply with BLM VRM policy, the Visual Resource Inventory (VRI) that was used to develop agency visual management objectives within the Las Vegas RMP/EIS should be addressed and documented accordingly within the eontext of the Project. Therefore, the VRI components of distance zones, scenic quality, and Sensitivity Level Rating Units (SLRUs) and subsequent Visual Resource Inventory Classes (VRIC) are addressed in section 3.12.3.2 – Agency Visual Management Objectives. BLM land in Nye County is currently managed within the framework of the Las Vegas RMP/EIS (BLM 1998).

3.12.1 Overview

The proposed Project is located within the Mojave Desert section of the Basin and Range Province. The Basin and Range Province is distinguished by isolated, roughly parallel mountain ranges separated by closed desert basins (Fenneman 1931). Mountain ranges trend north to south with distinctive alluvial areas at their bases (known locally as *bajadas*). The Mojave Desert is characterized by linear desert mountains separated by large desert plains, some of which are 50 to 70 miles in length. The vegetation community that occurs within the Mojave Desert is characterized by dominant stands of low-growing ereosote bush, burrobush, and saltbush, with varied occurrences of Joshua tree as the indicator species of the Mojave Desert, although no Joshua trees are located within the Project area (Brown 1994).

The proposed Project is located in the Amargosa Valley, a basin loosely surrounded by the Yucca Mountains approximately 13 miles to the north, the Spring Mountains approximately 23 miles to the east, and the Funeral Mountains stretching approximately 12 miles from the south and 8 miles to the west. The Amargosa Valley encompasses approximately 500 square miles. The valley generally drains to the south towards the Amargosa River which is fed by several smaller washes, including Fortymile Wash, which crosses through the Project site. The topographic nature of the valley is flat with subtle elevation change.

There are approximately 80 residences and related community facilities within a 2-mile radius from the Project site. These populated areas contain denser vegetation that is not native to this portion of the Mojave Desert, including Cottonwoods and extensive amounts of Salt Cedar.

Cultural modifications that have affected the regional setting are predominantly associated with the Town of Amargosa Valley (and commercial land uses), industry related to farming (including center-pivot irrigated agricultural fields) and ranching, mining (gravel pits to the south and a large volcanic cider mine to the north), and community/commercial facilities to the northeast, east, and southeast of the site.

The local setting within, and immediately adjacent to the Project area, has been modified by several utility lines including single-pole, wooden distribution lines (one crossing the Project site east to west and one crossing north to south), two cell phone towers, and a radio transmission tower directly east of the site. Regional modifications (within 5 miles) include one double-circuit wooden pole transmission line, approximately 2 miles to the south; two substations (one 2 miles to the south and one 5 miles southeast of the Project site); and a single-circuit transmission line running parallel to NV 373 on the east side. Other regional cultural modifications include major transportation corridors US 95, NV 373, and numerous local roads that border the Project site on three sides.

3.12.2 Inventory

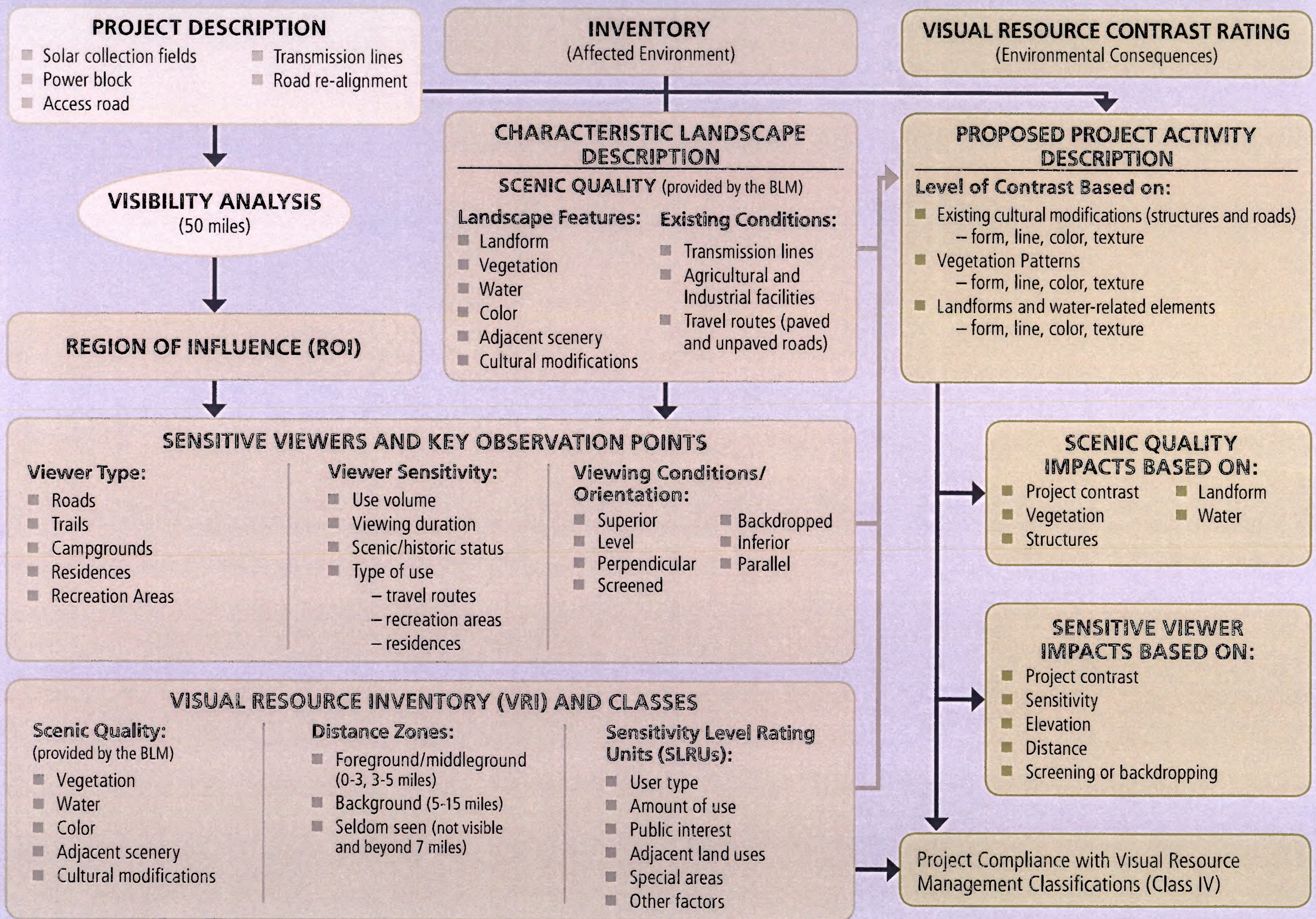
3.12.2.1 Methods

Figure 3-17 illustrates the methodology associated with the visual resource inventory and subsequent impact assessment for the Project. The inventory methods discussed below are consistent with the concepts found within BLM Manual H-8410-1 – Visual Resource Inventory (BLM 2007b).

The Area of Potential Visual Effect (APVE) was defined using the BLM's definition of background distance zone, which is 5 to 15 miles. The visual resources inventory was conducted on federal, state, and private land within the APVE that may be affected by construction and operation of the Project. A viewshed analysis, based on BLM direction, was conducted using GIS to assess where the Project could be visible within a 50-mile radius of the proposed right-of-way. This larger area defines the visual ROI that will be assessed for the Project. The results of the viewshed analysis were used to establish Key Observation Points (KOP) which were used for subsequent analysis in Chapter 4. Data collected within the APVE and ROI were based on reviews of aerial photographs, topographic maps, planning documents, consultation with the BLM and affected municipalities, and field investigations.

The visual inventory elements of scenery (scenic quality), sensitive viewers (including distance zones and viewing conditions), and visual agency management objectives are described below (Figure 3-18).

Figure 3-17 | VISUAL RESOURCE ASSESSMENT METHODOLOGY | Amargosa Solar Energy Project



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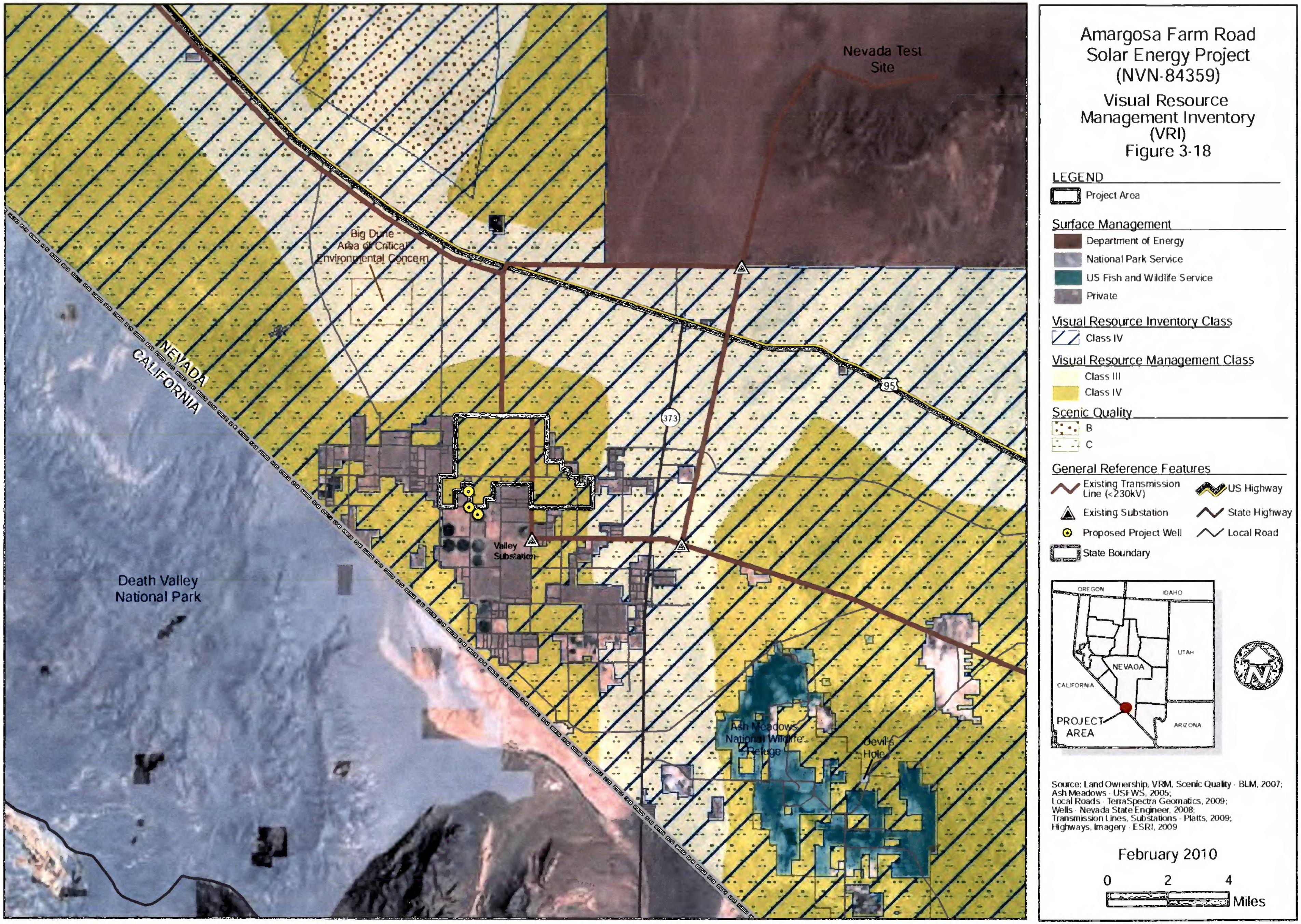

Amargosa Farm Road Solar Energy Project (NVN-84359)
Visual Resource Management Inventory (VRI)
Figure 3-18
LEGEND
Project Area
Surface Management
Department of Energy
National Park Service
US Fish and Wildlife Service
Private
Visual Resource Inventory Class
Class IV
Visual Resource Management Class
Class III
Class IV
Scenic Quality
B
C
General Reference Features
Existing Transmission Line (<230kV)
US Highway
Existing Substation
State Highway
Proposed Project Well
Local Road
State Boundary
OREGON
IDAHO
UTAH
NEVADA
CALIFORNIA
ARIZONA
PROJECT AREA
N
Source: Land Ownership, VRM, Scenic Quality - BLM, 2007;
Ash Meadows - USFWS, 2005;
Local Roads - TerraSpectra Geomatics, 2009;
Wells - Nevada State Engineer, 2008;
Transmission Lines, Substations - Platts, 2009;
Highways, Imagery - ESRI, 2009
February 2010
0 2 4
Miles
Nevada Test Site
Big Dune Area of Critical Environmental Concern
NEVADA
CALIFORNIA
95
373
Valley Substation
Death Valley National Park
Ash Meadows National Wildlife Refuge
Devil's Hole

3.12.2.2 Existing Conditions

Existing conditions are based on the occurrences of cultural modifications within the landscape that contribute to the overall visual character associated with a given area. Existing conditions can range from natural to completely modified based on the visual influence of pipelines, transmission lines, transportation routes, and other structural features. Existing conditions were inventoried within the APVE using aerial photography and were field verified.

3.12.2.3 Sensitive Viewers

The term *sensitive viewers* refers to sensitive viewing locations and their associated viewers. Residences, travel routes, or trails are examples of locations where viewers typically are sensitive to visual modifications of the landscape. Key Observation Points (KOPs) represent critical viewpoints or typical viewing conditions associated with sensitive viewers. Potential sensitive viewers that may have views of the proposed Project are typically identified and field verified within the defined APVE background distance zone of 15 miles (BLM 2007b); however, based on the large scale of the Project and per BLM direction, sensitive viewers were also identified in the ROI. The identification of sensitive viewers was based on a review of aerial photography, a review of regional and local topographic maps, the results of the 50-mile radius viewshed analysis, agency and public input, and field investigations including photo documentation using high-resolution photography. Sensitive viewers are anticipated to include:

- Travel routes – highways and roads used by origin/destination travelers, designated scenic or historic byways, and recreation destination roads (i.e., roads that provide recreation access)
- Recreation areas – existing recreation sites used for picnicking, camping, hiking, scenic overlooks, rest areas, or other recreational activities
- Residences – single-family, detached structures, and permanent mobile homes or mobile home parks

Sensitive viewers and subsequent KOPs were approved by the BLM and illustrated in Figure 3-19.

In the context of this visual study, visual sensitivity is defined as the degree of concern for changes to the landscape that, in the context of the proposed Project, may range from high to moderate to low. The sensitivity rating is based on the following five criteria: (1) type of use, (2) volume of use, (3) viewing duration, (4) concern for aesthetics, and (5) scenic or historic status. Scenic or historic status may increase the amount of use and viewing duration for viewers. Visual sensitivity also varies with each type of user. Recreational users are typically highly sensitive to changes in the landscape based on their expectation for a particular recreational experience, whereas commuters are typically moderately sensitive because they are more concerned with getting to a destination in a timely manner (aesthetics is secondary). Residences typically have the highest sensitivity due to high use and viewing duration. These criteria determine the composite level of viewer sensitivity as it pertains to specific sensitive viewers. Table 3-33 provides a list of inventoried sensitive viewers. It is important to note that the described definition of sensitivity is associated with the sensitive viewers potentially affected by

the project and not associated with the sensitivity of the landscape. Landscape sensitivity, a planning level inventory component, is described in Section 3.12.3.2.

3.12.2.4 Scenic Corridors

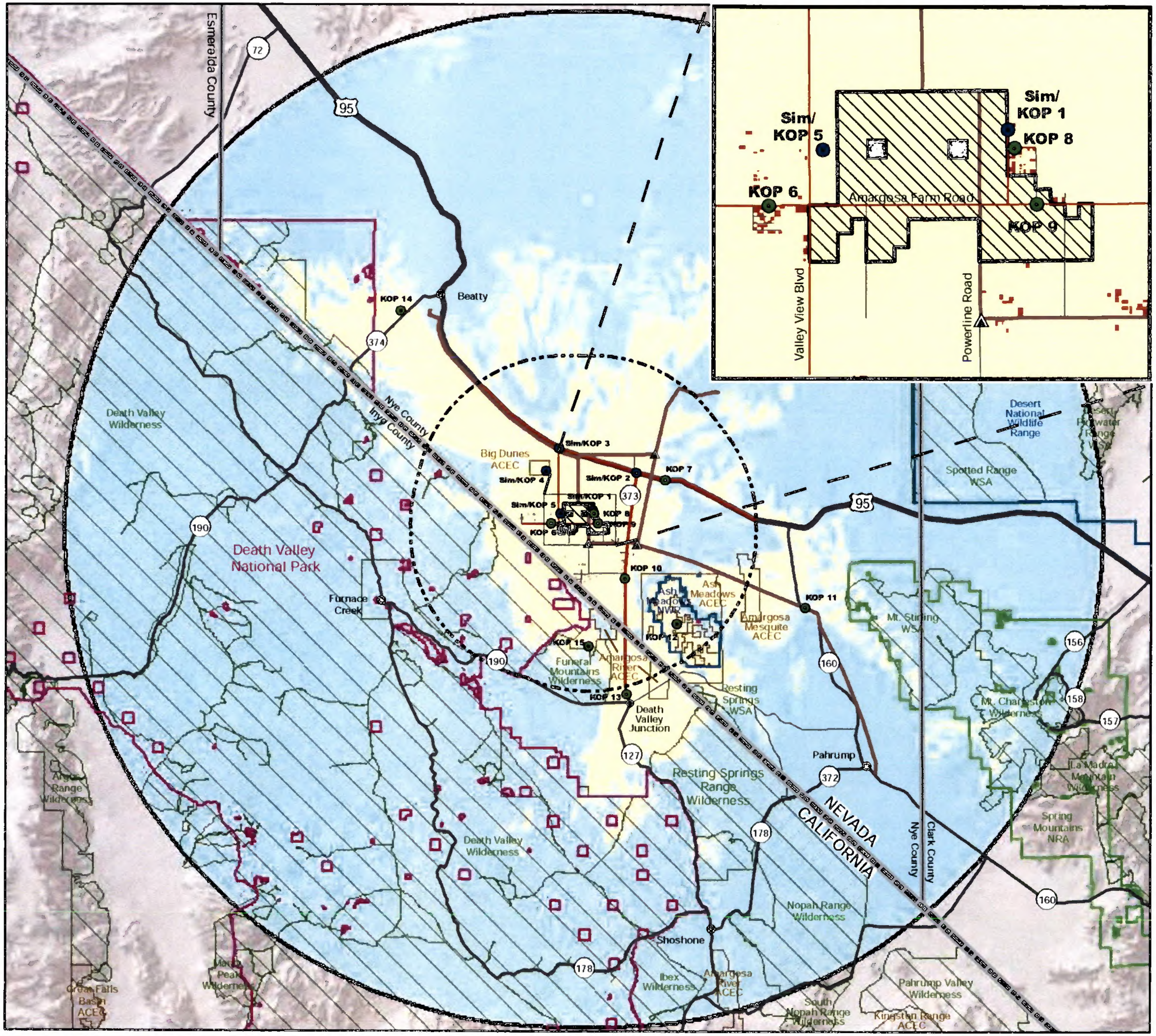
There are no designated scenic corridors in the Project area. US 95 is not a designated scenic highway; however, NDOT has determined that the highway is eligible as a scenic corridor called Mojave Desert Vista (from Clark County to the NV 266 junction, south of Goldfield, Nevada). The proposed scenic corridor concentrates on preserving the existing rural character of the region, including panoramic views and existing vegetation, improved recreation/travel information for Amargosa Valley at the rest area, and enhance the recreational opportunities afforded by Big Dune and Ash Meadows through signage improvements.

3.12.3 Visibility Analysis

Due to surrounding topography of Amargosa Valley, it was likely that sensitive viewers in the background distance zone (5 to 50 miles) would be screened from various Project components (e.g., solar fields, transmission lines within the project area, and power blocks). Based on the results of the viewshed analysis, 15 KOPs were selected to represent critical viewing conditions for each sensitive viewer group: travel routes (6), recreation areas (5), and residences (4).

3.12.3.1 Distance Zones and Viewing Conditions

The BLM VRM system uses established distance zones (BLM 2007b) in part to determine VRM classes (see Section 3.12.3.2). Distance zones represent the relative visibility of a given landscape from sensitive viewing locations or KOPs which include; foreground/middleground (0 to 5 miles), background (5 to 15 miles), and seldom-seen (areas that are not visible within the foreground-middleground and background distance zones). Landscape features typically become less detailed and obvious as distance from a viewpoint increases. In this regard, the BLM's distance zones were used to help characterize existing visual conditions associated with sensitive viewers potentially affected by the project (see Section 3.12.4.4). In the context of impact assessment, the BLM's established distance zones were used as the framework to establish project specific distance zones appropriate for impact assessment which is further discussed in Section 4.12.1.2.



Amargosa Farm Road Solar Energy Project (NVN-84359)

Viewshed Analysis, Sensitive Viewers, and Key Observation Points Figure 3-19

Project Components

- Project Area
- Power Block

Project Features

- Background Zone (15-mile)
- Sensitive Viewer Inventory Boundary (50-mile)

Sensitive Viewers

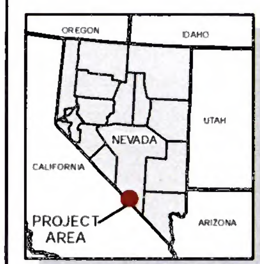
- Residence
- Travel Route
- Key Observation Point (KOP)
- Simulation Key Observation Point (Sim/KOP)

Seen/Unseen

- Unseen
- Seen

General Reference Features

- Substation
- Below 230kV Transmission Line
- National Park
- National Recreation Area (NRA)
- National Wildlife Refuge (NWR)
- Wilderness Area
- Area of Critical Environmental Concern (ACEC)
- US Highway/ Interstate
- State Highway
- Local Road
- State Boundary
- County Boundary



Source: BLM, 2009; USFWS, 2005; ESRI, 2009; EPG, 2009; Platts, 2008

February 2010

0 9 18 Miles

Table 3-33 Sensitive Viewers and Viewer Sensitivity Analysis

Sensitive Viewers		Sensitivity					Visibility		
		Use Volume	Viewing Duration	Aesthetic Concern	Scenic/ Historic	Overall Sensitivity	Screening	Comments	KOP
Travel Routes									
U.S. Highway	US 95	H	S	M		M	Partial (vegetation, topography)		Yes (2)
State Routes	State Route (NV) 374	L	M	M		M	Minimal to partial (topography, vegetation)		No
	NV 373	M	M	M		M	Yes (topography, vegetation)		
	CA 127	L	M	M		M	Yes (topography, vegetation)		
	State Route 160	M	S	M		M	Partial (topography, vegetation)		Yes
	Lathrop Wells Rest Area	M	M	M		M	Minimal to partial (topography, development)		Yes
Local Access Routes	Amargosa Farm Road	M	L	M		M	Minimal		Yes (2)
	Sandy Lane	L	L	M		M	Minimal		No
	Valley View Road	M	L	M		M	Minimal		No

Table 3-33 Sensitive Viewers and Viewer Sensitivity Analysis

Sensitive Viewers		Sensitivity					Visibility		
		Use Volume	Viewing Duration	Aesthetic Concern	Scenic/ Historic	Overall Sensitivity	Screening	Comments	KOP
	Williamson Road	M	L	M		M	Partial (vegetation)		No
	Atomie Road	M	L	M		M	Partial (vegetation)		No
	Barnett Street	M	L	M		M	Partial (vegetation)		No
	Frontier Road	M	L	M		M	Partial (vegetation)		No
	Senior Center Road	M	L	M		M	Partial (vegetation)		No
Recreation									
	Ash Meadows NWR – Visitor Center	M	H	H		H	Minimal to eomplete (topography, vegetation)		No
	Ash Meadows NWR – Crystal Springs Boardwalk Trail	M	H	H		H	Minimal to eomplete (topography, vegetation)		Yes
	Ash Meadows NWR – Crystal Reservoir boat launch	M	H	H		H	Minimal to eomplete (topography, vegetation)		No
	Ash Meadows NWR – Peterson Reservoir boat launeh	M	H	H		H	Minimal to eomplete (topography, vegetation)		No
	Ash Meadows NWR – Devils Hole	M	H	H		H	Minimal to eomplete (topography, vegetation)		No
	Ash Meadows NWR – Point of Rocks Springs	M	H	H		H	Minimal to eomplete (topography,		No

Table 3-33 Sensitive Viewers and Viewer Sensitivity Analysis

Sensitive Viewers		Sensitivity					Visibility		
		Use Volume	Viewing Duration	Aesthetic Concern	Scenic/ Historic	Overall Sensitivity	Screening	Comments	KOP
	picnic area						vegetation)		
	Amargosa Community Park	H	H	H		H	Partial (vegetation)		No
	Amargosa River ACEC	L	M	H	S	H	Complete (topography and vegetation)	No numbers for visitors, just comments on *rarely visited*	No
	Funeral Mountains Wilderness Area – unnamed hiking trails	L	M	H		H	Minimal	No numbers for visitors, just comments on *rarely visited*	Yes
	Death Valley National Park	H	H	H	S	H	Complete (topography)		No
	Death Valley National Park – Indian Pass	H	H	H		H	Complete (topography)		No
	Big Dune	M	H	M		M	Minimal to partial (topography, vegetation)		Yes
Residences									
	Amargosa Valley (east of Sandy Lane)	H	H	H		H	Partial to Complete (vegetation)		Yes
	Amargosa Valley (downtown)	H	H	H		H	Partial to Complete (development and vegetation)		Yes

Table 3-33 Sensitive Viewers and Viewer Sensitivity Analysis

Sensitive Viewers		Sensitivity					Visibility		
		Use Volume	Viewing Duration	Aesthetic Concern	Scenic/ Historic	Overall Sensitivity	Screening	Comments	KOP
	Dispersed Residences (west of Valley View Road)	H	H	H		H	Minimal to complete (topography, vegetation)		Yes
	Dispersed Residences (south of Amargosa Farm Road)	H	H	H		H	Complete (topography, vegetation)		No
	Death Valley Junction	H	H	H		H	Complete (topography)		Yes
Community Facilities									
	Amargosa Senior Center	M	M	M		M	Partial (vegetation)		No
	Amargosa Valley School and Community Center	M	M	M		M	Partial (vegetation)		No
	AVIA Community Center/Amargosa Raceway	M	M	M		M	Partial to Complete (development and vegetation)		No
Historical									
	Tom Kelly Bottle House, Rhyolite	M	M	M	H	M	Complete (topography)	Only official SHPO Property in Rhyolite	No
	Rhyolite cemetery	M	M	M		M	Minimal to Complete (topography, vegetation)		Yes

Viewing conditions relate to the physical elements of the landscape and / or viewing locations that effect how the Project area is currently viewed. Viewing conditions typically include, but are not limited to; viewing position, screening (i.e. vegetation, topography, and existing municipal structures), and backdropping and/or skylining. Viewing position could range from superior, where the viewer is looking down at the Project area, to inferior, where the viewer is looking up at the Project area. Screening is typically described as minimally, partially, and completely screened, and pertains to elements sueh as vegetation and topography that inhibit the visibility of the Project area. Landscape features can also can be skylined or backdropped by adjacent terrain, vegetation, or structures. When a landscape feature is backdropped, the color, texture, and form of the feature are subdued, thus reducing visibility. When a landscape feature is skylined, portions of it will appear above the horizon line and would be seen in the context with typically blue sky.

3.12.3.2 Agency Visual Management Objectives

The BLM VRM system establishes management guidance for the level of acceptable visual change allowed in the landscape. The system requires inventorying scenic values and establishing visual management objectives for those values through the resource management planning process. Specifically, the following resources are inventoried to establish Visual Resource Management (VRM) classes and comprise the planning level VRI including Scenic Quality, Distance Zones, and SLRUs as described below.

Scenic Quality – Scenic quality is defined by the BLM as the measure of the visual appeal of a tract of land. Scenic Quality Rating Units (SQRUs) are established based on like physiographic characteristics including similar visual patterns, textures, colors, variety, etc. Once the SQRUs are delineated, an evaluation occurs and each SQRU is ranked A, B, or C based on; landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications (existing conditions). Scenic quality was provided by the BLM for inclusion in the visual resource inventory (see Section 3.12.1.4) and subsequent impact analysis to scenery.

Distance Zones – Distance Zones represent the relative visibility of the landscape from viewing locations such as travel routes or observation points. Three zones have been identified by the BLM which include foreground/middleground (0 to 5 miles), background (5 to 15 miles), and seldom-seen (areas that are not visible within the foreground-middleground and background distance zones). A viewshed analysis is performed and combined with the distance zones information to finalize the inventory of distance zones. Although distance zones were used to develop VRM classes for the Las Vegas and Pahrump Field Offices, the data was not available at the time of this Draft EIS. Therefore, if deemed necessary, the BLM will prepare distance zone data for inclusion in the Final EIS.

Sensitivity Level Rating Units (SLRUs) – SLRUs represent the relative sensitivity of a given tract of land and is based upon; type of user, amount of use, public interest, adjacent land uses, special areas, and other factors. Landscape sensitivity can range from high to moderate to low and largely is associated with scenic quality rating units. It is important to note that although related, the sensitivity of the landscape does not equate to sensitivity of viewers or viewing locations within that landscape. Although SLRUs were used to develop VRM classes for the Las

Vegas and Pahrump Field Offices, the data was not available at the time of this Draft EIS. Therefore, if deemed necessary, the BLM will develop SLRU data for inclusion in Final EIS.

The three VRI components (scenic quality, distance zones, and SLRUs) are combined to determine Visual Resource Inventory Classes (VRIC) as depicted on Figure 3-18. These classes are reviewed by the BLM in context with other resource plans and objectives and updated accordingly to determine VRM classes (depicted on Figure 3-18) ranging from Class I to Class IV. Following are the management objectives associated with VRM Classes I-IV:

- Class I – To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
- Class II – To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements found in the predominant natural features of the characteristic landscape.
- Class III – To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not be dominate the view of the casual observer. Changes must repeat the basic elements found in the predominant natural features of the characteristic landscape.
- Class IV – To provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

3.12.4 Inventory Results

3.12.4.1 Scenery (Scenic Quality)

The Project area is sited on terrain and vegetation characterized by flat to slightly rolling plains, with low vegetative diversity associated with creosote flats. Based on scenic quality inventory data provided by the BLM (see Figure 3-18), the Project area is characterized as Class C scenery. The majority of the visual ROI is also associated with Class C scenery extending east to west from the Rock Valley Wash to the Amargosa River and north to south from US 95 to the Nevada/California border.

3.12.4.2 Existing Conditions

Existing conditions within the APVE were primarily influenced by the following cultural modifications:

- Transmission/Distribution lines – electrical utility structures
- Industrial facilities – farm and ranching related facilities, mining

- Highways – paved with two or more traffic lanes and a median
- Primitive roads – regularly maintained dirt/gravel or unimproved roads
- Residences – Armargosa Valley residences and dispersed residences
- Community Facilities – local schools, community centers, churches

3.12.4.3 Nighttime Lighting

Existing or potential sources of nighttime light in the ROI include the residences of Amargosa Valley and several industrial or commercial operations, including mining facilities, commercial businesses on US 95, and agricultural facilities. Another source of lighting is the constant traffic along US 95. Recreation users at Big Dune were observed using bonfires that were visible from residences immediately adjacent to the Project site. Las Vegas is a minor source of nighttime light in the region and is approximately 80 miles from the proposed Project.

3.12.4.4 Sensitive Viewers

Sensitive viewers within the 15-mile APVE and 50-mile ROI were initially identified as potential sensitive viewers. Sensitive viewers that were visually separated (screened) by topography and/or vegetation from the proposed Project were determined to have no effect and were documented as such.

Travel Routes

U.S. Highways – Travelers on these highways typically have moderate sensitivity and are typically focused on commuting to a destination with moderate concern of aesthetics.

- US 95 (KOP 3, KOP 7) – This eligible scenic corridor is a major regional transportation highway for local travelers between Las Vegas and Beatty, and a major connector route from Las Vegas and the Reno area that eventually connects to California. Travelers along this route typically are focused on utility over aesthetics and would have a short viewing duration of the Project in the background to middleground distance zone. The proposed Project would be back-dropped by the northeastern edge of the Funeral Mountains (Death Valley National Park) to the southwest, and partially backdropped by the Resting Spring Mountain Range to the southeast for east-bound travelers (KOP 3) and by the Funeral Mountains for west-bound travelers.

State Routes – These routes typically have travelers with moderate sensitivity with a moderate concern for aesthetics. Travelers on these routes are more frequent (local) travelers with a concern for shorter trips (commute) to their destinations over aesthetics.

- NV 160 (KOP 11) – This regional travel route is used primarily by local commuters to and from Pahrump and the small community of Crystal and US 95. Travelers along NV 160 are typically traveling at a moderate rate of speed, although the road is an alternate travel route for recreational visitors to Death Valley National Park and Humboldt-Toiyabe National Forest. The proposed Project would be located in the background

distance zone (more than 15 miles) and backdropped by the Funeral Mountains. Some sections of NV 160 provides a superior view of Amargosa Valley.

- NV 373 (KOP 10) – This local travel route is used primarily by residential travelers and travelers to local community facilities. NV 373 is a primary travel route to Ash Meadows NWR and an alternate route to Death Valley National Park. The proposed Project would be in the middleground with partial screening due to vegetation and slight rolling topography from a level viewpoint. Travelers would typically travel at a moderate rate of speed connecting to local residences and local commercial facilities (e.g., convenient stores, casino, bank).

- CA 127 (KOP 13) – This travel route is a continuation of NV373 into California. CA 127 is primarily for travelers to Death Valley Junction; an alternate connection to Pahrump, Nevada and Death Valley National Park from Nevada; and a primary travel route to Ash Meadows NWR from California. The Project would be in the background with partial screening due to vegetation and slight rolling topography from a level viewpoint.

- NV 374 (KOP 14) – This travel route is used primarily by recreation travelers between Beatty and Death Valley National Park. Travelers along this route typically travel at a moderate rate of speed with a higher concern for aesthetics. The proposed Project would be visible in the background distance zone (more than 15 miles) from a superior viewing position.

- Lathrop Wells Rest Park (KOP 2) – Lathrop Wells Rest Park is an NDOT rest area for travelers along US 95. Visitors to the rest area would have short duration, level, and partially screened background views of the Project.

Local Access Routes – These routes typically have travelers with moderate sensitivity based on a moderate concern for aesthetics and moderate viewing durations due to local speed limits and local commuter routes. These routes provide direct access to local destinations such as commercial, agricultural, and residential areas that are frequented daily.

- Sandy Lane – This local street is adjacent to the Project site along the eastern boundary. Travelers would have the proposed Project in the foreground with no screening and a level vantage point.

- Amargosa Farm Road (KOP 6, KOP 9) – This local connector road is adjacent to the Project site along the southern boundary. Travelers heading east-bound would view the Project in the foreground distance zone with no screening and a level vantage point (KOP 6). West-bound travelers (KOP 9) will have level, partially screened to unobstructed foreground views of the Project. A realignment of Amargosa Farm Road is part of the proposed Project which would result in direct, unobstructed views of the solar facility on potentially both sides of the future road.

- Valley View Road – This road is a primary travel route for residences and local travelers that connects US 95 to the Amargosa Valley community. The first mile off of US 95 is an alternate travel route to Big Dune recreation area with the primary entrance to Big Dune

off of US 95, approximately 5 miles northwest of Valley View Road. Travelers along Valley View Road would have level views of the proposed Project in the middleground to foreground distance zone as one travels south. The potential for skylining would be greater for travelers along Valley View Road than any other viewer in the ROI.

Recreation Areas

These areas typically have visitors (viewers) with primarily high sensitivity to landscape change based on their expectation for high quality landscapes and long viewing durations. For some recreation viewers, aesthetics are second to the actual recreation activity, such as target shooting or off-road vehicle activities.

- Ash Meadows NWR (KOP 12) includes recreation travel routes, trails, and trailheads, as well as wilderness and wildlife viewing opportunities. Due to a high concern for aesthetics and wildlife viewing and concern for solitude, viewer sensitivity would be high. Users would have level to slightly inferior views of the proposed Project in the background distance zone. However, the potential for direct unobscured views is low due to topography and vegetation. Death Valley National Park manages Devils Hole, a 40-acre site within Ash Meadows. Distant views of the proposed Project from Devils Hole would be completely screened by topography.

- Death Valley National Park is a major tourist destination drawing approximately 1 million visitors (viewers) per year. Visitors to all formalized trailheads, in-park travel routes, visitor centers, and campgrounds/picnic areas will not have views of the proposed Project because the topography of the Funeral Mountains physically separates formal recreation areas with the park and Amargosa Valley.

- Big Dune (KOP 4) – Big Dune recreation area is an area of approximately 1,000 acres consisting of natural sand dunes on BLM land that is easily accessible to the public. The primary recreation is OHV use on informal trails throughout the recreation area. OHV users typically focus their attention on their immediate surroundings, typically decreasing their overall concern / expectations for aesthetics. These moderate sensitivity viewers would view the Project in the middleground for short durations. In addition to OHV activities, Big Dune offers primitive camping, including recreational vehicle camping.

- Funeral Mountains Wilderness (KOP 15) – The wilderness located approximately 10.5 miles south of the Projeet area, offers dispersed recreation within the wilderness area and non-vehicular access to Death Valley National Park. The Funeral Mountain Wilderness is closed to vehicular traffic, but is open to non-vehicular pedestrian traffic who would have a superior, background view of the proposed Project. Several unnamed trails are oriented north-south in the narrow valleys between mountains and offers views of the Amargosa Valley (KOP 15). Visitors to Funeral Mountain Wilderness are anticipated to have moderate to long viewing durations and a high concern for aesthetics.

- Amargosa River ACEC – Three distinct units comprise the Amargosa River ACEC, with the nearest unit being the Upper Amargosa Mesquite Bosque Unit – a 2,720-acre site west of CA 127 and south of the Nevada/California state line. The ACEC is situated

around the Amargosa River and is located 8 miles south of the Project area. The proposed Project would not be seen from the Upper Amargosa Mesquite Bosque Unit. The Upper Amargosa Mesquite Bosque Unit was established primarily as a unit of the Amargosa River ACEC due to its recreation value and the natural setting 'provides opportunities for activities such as sightseeing, bird and wildlife viewing, photography, and solitude'. The Upper unit visitors would not have views of the Project area due to topography and vegetation.

Residences

Each grouping of residences listed below are anticipated to have a high sensitivity based on a long viewing duration, and heightened concern for aesthetics or changes in the landscape. Development within Amargosa Valley can be characterized as low density (1-acre lots and larger). All residences are located within the Amargosa Valley in which the proposed Project would be located and all have level viewing positions. A large number of residences immediately adjacent to the Project area have dense and mature vegetation borders around their respective properties, which tend to screen views toward the Project area. The majority of the vegetation screening is Salt Cedar, an evergreen invasive tree that is known for its size and dense foliage.

- Valley View Estates (KOP 5) – Residential viewers in Valley View Estates and along the western side of Valley View Road are typically more dispersed and would view the proposed Project in the foreground. Two partially constructed houses along Frontier Road between Valley View Road and the Project site have no vegetative screening and would have level, unobstructed foreground views of the Project.

- Residents along Sandy Lane (KOP 1) would have direct, unobstructed foreground views of the proposed Project from a level viewing position. However, for some viewers, mature vegetation partially screens views toward the Project area. The residential units of Sandy Lane would be within 50 feet of the Project right-of-way and 700 feet of the proposed Project facilities.

- Residences east of Sandy Lane (KOP 8 representational of these residences) – Residential viewers in Amargosa Valley east of the Project site would have foreground, unobstructed to completely screened views of the Project, respectively. A large number of residences in this area have mature vegetation that follows property lines in a straight, linear fashion which provides screening of the Project area.

- Residences south of Amargosa Farm Road – Residences south of the Project area are dispersed and are typically located within farming complexes. Residences in this area would have level, foreground to middleground partially to fully screened views of the proposed Project.

Community Facilities

- Amargosa Valley School and adjacent Community Center – Providing services to local residents, these facilities are level with the proposed Project and are generally surrounded

by vegetation and residential structures. Views of the proposed Project would therefore be partially to fully screened and in the foreground of viewers using these facilities. Sensitivity to landscape change is typieally moderate because views are largely focused inward and the facilities themselves occur with a modified rural- to suburban setting.

- Community Park, Amargosa Senior Center, and AVIA Community Center – These facilities offer local residents recreational and social opportunities, with the park having outdoor recreational opportunities. The community park and Senior Center have vegetative screening along the western boundary of their respective properties, partially screening foreground views of the proposed Project. Viewers from the AVIA Community Center would have foreground to middleground views of the proposed Project, partially screened by residences and their associated vegetation closer to the Project area. Sensitivity is anticipated to be moderate for viewers using these facilities.

Historic Features

- Rhyolite is a historic Ghost Town and associated cemetery with no commercial business or occupied residences. The cemetery (KOP 14) is located approximately 25 miles northwest from the Project area with potential views in the background. Visitors to Rhyolite are typically there for a short duration as most are passers-thru to other destinations. Viewers would have superior views with short to moderate time durations. Due to topography between the Project site and Rhyolite, the majority of the ghost town, including Tom Kelly Bottle House (the only SHPO listed property in Rhyolite) is completely screened by Ladd Mountain. For the remaining properties not screened by Ladd Mountain, rolling topography as well as atmospheric conditions due to the distance from the Project reduces the potential visibility of the proposed Project.

3.12.4.5 Agency Visual Management Objectives

The proposed Project would be located on BLM designated VRM Class IV land. The management objective for Class IV lands is, "*To provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements*" (BLM 2007b).

3.13 Hazardous Materials, and Hazardous and Solid Waste

Certain chemicals and materials to be used during the construction and operational phases of the proposed Project are characterized as hazardous materials. In addition, construction and operational activities would generate certain hazardous and non-hazardous solid waste streams. This section discusses existing conditions in the Project area relevant to hazardous materials and hazardous and non-hazardous waste. Regulations that would govern the management of these materials and waste during construction and operation are described. The types of materials to be

used or types of waste generated during construction and operations, and the potential impact on the human environment are described in Chapter 4.

3.13.1 Affected Environment

A consideration for hazardous materials analyses is the proximity of residential and other sensitive receptors, such as schools, daycare centers, emergency response facilities, and long-term care facilities. The nearest sensitive receptor is the area surrounding the Amargosa Community Complex, which is located approximately 0.5 mile east of the proposed Project site and adjacent to the community center, town offices, the emergency services center, sheriff's substation, a town library, the health clinic, and the Amargosa Valley School. The Amargosa Valley Community Complex also includes a residential area between Sandy Lane and Williamson Road. Several homesteads are located west of Valley View Road, approximately 0.5 mile west of the proposed Project site. The area north and south of the Project site is primarily undisturbed desert land.

The general population may include sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding the Project site may have a large bearing on health risk. The potential impact on sensitive receptors from construction and operation of the proposed Project is described in Chapter 4.13.

3.13.2 Regulatory Framework

3.13.2.1 Hazardous Materials

Use, storage, and disposal of hazardous materials are regulated by numerous local, state, and federal laws. Table 3-34 summarizes regulations applicable to storage and use of hazardous materials.

Table 3-34 Summary of Applicable Regulations for the Use, Storage, and Disposal of Hazardous Materials

Regulation	Requirements/Applicability
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA): 42 USC Section 9601 et seq. Title 40 CFR Part 302	Requires notification to various agencies when there is a release of hazardous substances from a facility.

Table 3-34 Summary of Applicable Regulations for the Use, Storage, and Disposal of Hazardous Materials	
Regulation	**Requirements/Applicability**
Emergency Planning and Community Right to Know Act of 1986 (EPCRA), commonly known as SARA Title III: 42 USC Section 11001 et seq.; Title 40 CFR Parts 350, 355 370, and 372	Requires inventory reporting, planning, and reporting for storage and release of hazardous and acutely hazardous materials.
EPCRA, Section 302 (Pub. L. 99–499), 42 USC 11022	Requires agency notification if extremely hazardous substances are stored in excess of Threshold Planning Quantities (TPQ).
EPCRA, Section 311, (Pub. L. 99–499, 42 USC 11021)	Requires that either material data safety sheets for all hazardous materials or a list of all hazardous materials be submitted to Nevada Emergency Response Commission and local fire department.
EPCRA, Section 313, (Pub. L. 99–499, 42 USC 11023)	Requires annual reporting of releases of hazardous materials.
OSHA 29 USC Section 651 et seq., Title 29 CFR Part 1910 Safety and Health Regulations for Construction: Title 29 CFR Part 1926	Specifies standards for hazardous materials storage, handling, and worker protection in emergencies.
Oil Pollution Prevention: Title 40 CFR Part 112	Requires the preparation of a Spill Prevention Control and Countermeasure (SPCC) Plan if storage capacity exceeds certain volumes, and should there be a reasonable possibility that the tank(s) may discharge oil into navigable waters of the U.S.
Hazardous Materials Transportation 49 CFR 171-172	Requires transporters of hazardous materials to properly label, manifest, package, and ship hazardous materials.
Chemical Accident Prevention Provisions, Title 40 CFR Part 68	Requires the preparation of a Risk Management Plan if certain listed toxic or flammable substances are used in excess of the listed threshold quantity.
Chemical Facility Antiterrorism Standard, 6 CFR Part 27	Requires facilities that possess any "chemicals of interest" above threshold quantities must register and provide specified information to the Department of Homeland Security.
Hazard Communication (HAZCOM) Program 29 CFR 1910.1200 Safety and Health for Construction 29 CFR 1926.1 et seq	Requires employers to implement HAZCOM Standard that gives workers the right to know the hazards and identities of chemicals in their workplaces (29 CFR 1910.1200) Requires written procedures and personnel protective equipment for employees working with hazardous materials.

Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC Section 9601 et seq.; Title 40 CFR Part 302. CERCLA (also known as Superfund) prescribes that the National Response Center be notified for any release of a reportable quantity of a hazardous substance (42 USC Section 9603); describes notification requirements for any

potentially injured parties in connection with any such release (42 USC Section 9611(g)); and sets forth requirements for demonstration of financial responsibility in connection with the storage of hazardous substances (42 USC Section 9608(b)).

Superfund regulations define "hazardous substance" as any material appearing on lists referenced in Section 101, 42 USC Section 9601(14). The U.S. EPA's regulation, at Title 40 CFR Section 302.4, sets forth the list of hazardous substances under CERCLA and the reportable quantities for each.

Emergency Planning and Community Right to Know Act of 1986, 42 USC Section 11001 et seq.; Title 40 CFR Parts 350, 355, 370, and 372. The EPCRA is a stand-alone law passed in 1986 as part of the SARA, and is known as SARA Title III. Its purpose is to encourage and support emergency planning efforts at the state and local levels, and to provide the public and local governments with information to react to hazardous materials emergencies, as well as providing access to information about hazardous materials to the public.

The EPCRA requires each state to have a State Emergency Response Commission (SERC). The Nevada SERC is established by NRS 459.738. The SERC designates planning districts within the state and appoints Local Emergency Planning Committees (LEPC) to coordinate the activities of each planning district. The SERC has designated each county as a planning district, and each county has designed the LEPC with the approval of the SERC.

EPCRA specifies what kinds of chemical releases and quantities require notification, to whom reports and notification are required to go to, and establishes threshold planning quantities. The provisions of EPCRA require industries to comply with reports of storage, manufacture, and releases to specific agencies. Along with these reporting requirements, fees required by NAC 459.9918, 459.99181, 459.99182 and NRS 459.744 are collected and granted to state and local agencies to provide assistance in planning, training, and equipment activities to prevent, respond to, and mitigate hazardous materials incidents.

Occupational Safety and Health Standards, 29 USC Section 651 et seq.; Title 29 CFR Part 1910 and Safety and Health Regulations for Construction, Title 29 CFR Part 1926. These standards require employee training, Personal Protective Equipment, safety equipment, and written procedures, programs, and plans for ensuring worker safety when working with hazardous materials or in hazardous work environments. Although intended primarily to protect worker health and safety, these requirements affect general facility safety. To comply with these requirements, the Project will prepare and implement appropriate worker health and safety plans and policies.

Oil Pollution Prevention, Title 40 CFR Part 112. The Oil Pollution Prevention regulations require the preparation of an SPCC Plan if oil is stored at the facility in excess of 1,320 gallons in aboveground storage, and should there be a reasonable possibility that the tank(s) may discharge oil into navigable waters of the United States. The SPCC regulations place restrictions on the management of petroleum materials; therefore, SPCC regulations have some bearing on hazardous materials management.

Hazardous Materials Transportation Act, 49 CFR 171-172. The Hazardous Materials Transportation Act (HMTA) regulates transportation of hazardous materials, and is implemented by the U.S. Department of Transportation (DOT) under 49 CFR Parts 171-179. Analogous requirements are promulgated for hazardous waste under 40 CFR Part 263 by the EPA. The HMTA requires chemical manufacturers and hazardous waste generators and transporters to follow certain preparation, packaging, handling, loading/off-loading, routing, emergency planning, notification, and insurance requirements.

The HMTA requirements supplement the *Resource Conservation and Recovery Act* requirements regarding hazardous wastes. To comply with these requirements, employees who are involved in the shipping or receiving of chemicals, or shipping parts, products, or subassemblies that could be contaminated with hazardous substances, wastes (or residue) must follow the specified procedures for packaging, labeling, and shipping of these regulated materials.

Chemical Accident Prevention Provisions, Title 40 CFR Part 68. Title 40 CFR Part 68 requires the preparation of a Risk Management Plan if certain listed toxic or flammable substances are used in excess of the listed threshold quantity. The Risk Management Plan addresses in detail the emergency plan implemented at the facility and the response actions planned by the facility in the event of a hazardous materials release. The Risk Management Plan is based on studies identifying potential hazards associated with the handling of the listed materials used at the facility.

Two chemicals listed as Chemicals of Interest in the regulation, propane and acetylene, would be used on-site. However, only propane will be stored or used on-site during construction or operation of the Project in excess of the applicable threshold quantity. A maximum of approximately 76,000 pounds of propane will be stored above the threshold of 10,000 pounds. The amount of acetylene that will be stored on-site will be well below the applicable threshold of 10,000 pounds.

Pursuant to Title 40 CFR Section 68.126, flammable substances listed in Tables 3 and 4 of Section 68.130 are excluded from all provisions of the Federal Chemical Accident Prevention regulations when said substances are used as fuel or held for sale as fuel at a retail facility. Therefore, a Risk Management Plan would not be required for the proposed Project.

Chemical Facility Antiterrorism Standard, Title 6 CFR Part 27. The Chemical Facility Antiterrorism Standard (CFATS) of the Department of Homeland Security regulations requires that facilities that use or store certain hazardous materials in substantial quantities submit information to the Department of Homeland Security so that a vulnerability assessment can be conducted to determine what security measures should be implemented to ensure facility security. The administering agency is the Department of Homeland Security.

The Project proposes to use two chemicals listed as Chemicals of Interest in the regulation: propane and acetylene. However, only propane will be stored or used on-site during construction or operation of the Project in excess of the applicable threshold quantity. A maximum of approximately 76,000 pounds of liquefied petroleum gas (LPG) (principally propane) will be stored and present in each of the two power generation units on the Project site; this is above the threshold of 60,000 pounds. The amount of acetylene that will be stored on-site will be well

below the applicable threshold of 10,000 pounds. The CFATS will apply to the Project for propane.

3.13.2.2 Wastes, Hazardous and Regulated Non-Hazardous Solid Waste

The laws and regulations applicable to hazardous wastes and regulated, non-hazardous solid wastes that would be generated at the proposed Project facility are summarized in Table 3-35.

Table 3-35 Summary of Regulations Applicable to Hazardous and Non-Hazardous Wastes

Regulation	Requirements/Applicability	Administering Agency
Federal		
Resource Conservation and Recovery Act (RCRA) 42 USC s/s 6901 et. Seq. (1976) 40 CFR Part 260, 261, 262 Hazardous Waste Management applicable to Generators	Requires hazardous waste generators to obtain an Environmental Protection Agency Identification (EPA ID) number and annually register with the NDEP to accumulate and store hazardous waste for no more than 90 days and ship hazardous waste under a manifest to a licensed disposal site. Requires generator to identify and profile hazardous waste, store hazardous waste in appropriate containers, label containers stored on-site and transported to disposal site, and train operators in hazardous waste management.	EPA Region IX, NDEP
RCRA 42 USC s/s 6901 et. Seq. (1976) 40 CFR 263 Hazardous Waste Transportation, NRS 459	Requires hazardous waste generator to use registered transporters of hazardous waste that have an EPA ID number, use manifests to accompany waste shipments, and proper cleanup of any hazardous waste discharges.	EPA Region IX, NDEP, Nevada Department of Transportation (NDOT)
Universal Waste 60 FR 25542, May 11, 1995, as amended at 64 FR 36488, July 6, 1999; 70 FR 45520, Aug. 5, 2005 40 CFR 273	Requires management, employee training, and proper disposal of universal waste that includes batteries, fluorescent lamps, mercury switches, and pesticides.	EPA Region IX, NDEP
Used Oil Solid Waste Disposal Act, as amended (42 USC 6905, 6912(a), 6921 through 6927, 6930, 6934, and 6974); and CERCLA (42 USC 9601(37) and 9614(c)). 40 CFR 279 NAC Chapter 444	Requires generators of used oil to prevent spills and correctly label, store, transport, and dispose/recycle used oil.	NDEP, EPA Region IX

Resource Conservation and Recovery Act, 42 USC Section 6901 et seq. RCRA establishes requirements for the management of solid wastes (including hazardous wastes). The statute also addresses program administration, implementation and delegation to states, and enforcement provisions and responsibilities. Provisions are established for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing generator record keeping, labeling, manifests, emergency response information, training, and contingency plans.

Solid Wastes, Title 40 CFR Parts 240 – 257. These regulations were established by the EPA to implement the provisions of the Solid Waste Disposal Act. The regulations establish the criteria for classification of solid waste disposal facilities (landfills), provide operating standards for landfills, and provide storage requirements of solid wastes.

- Part 243 addresses general storage standards and recommended practices for solid wastes
- Part 246 addresses source separation for materials recovery guidelines
- Part 257 addresses the criteria for classification of solid waste disposal facilities and practices

Hazardous Wastes, Title 40 CFR Parts 260-268, 273, and 279. These regulations were established by the EPA to implement the provisions of RCRA. The regulations establish the criteria for classification of materials as hazardous wastes, define hazardous waste generator requirements, and specify requirements for management of used oil and universal wastes.

- Parts 260 through 268 provide the basic framework for characterizing, transporting and manifesting hazardous waste, as well as the storage requirements and requirements for disposing of hazardous wastes to land
- Part 273 addresses management of hazardous universal wastes (i.e., batteries, mercury containing equipment, and lamps)
- Part 279 addresses management of used oil and universal wastes (i.e., batteries, mercury containing equipment, and lamps)
- The EPA implements the regulations at the Federal level. However, Nevada is an authorized state, and so the regulations are implemented by state agencies and authorized local agencies in lieu of the EPA.

Hazardous Materials Regulations, Title 49 CFR Parts 171-180. The U.S. DOT has established standards for the transportation of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests, vehicle placards, and security plans.

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CHAPTER 4 - ENVIRONMENTAL EFFECTS

This chapter evaluates the environmental consequences that would result from construction and operation of the proposed Project, under the Proposed Action (dry-cooled alternative), wet-cooled alternative, and the No Action alternative. The impact analysis for environmental consequences focuses on potential direct, indirect, and cumulative effects on resources described in Chapter 3.0 - Affected Environment. In most cases, impacts are categorized and described in general terms without reference to facility type or location.

Direct effects are impacts that are caused by the construction and operation of the proposed Project and occur at the same time and place. These effects would result from the granting of the right-of-way by the BLM and subsequent construction and operation of proposed facilities. Indirect effects are those impacts that are caused by construction and operation of the proposed Project which are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include the effects of the withdrawal of groundwater, growth-inducing effects, and other effects related to induced changes in the pattern of land use, changes to the population density or growth rate, and related effects on the physical attributes of associated ecosystems.

The cumulative effects analysis is focused on the potential effects (direct and indirect) of construction, operation, and maintenance of the proposed Project combined with other past, present, and reasonably foreseeable future actions that could have effects in the ROI.

As described in Chapter 3.0, the ROI varies depending on the resource being analyzed and the predicted locations of direct and indirect impacts from construction and operation of the proposed Project.

4.1 Air Quality

To determine potential impacts of the proposed Project on air quality during construction and operations, the results of air quality investigations and modeling conducted by the Proponent at other sites in western United States were evaluated. The proposed Palen Solar Power Plant (PSPP) near Desert Center, California would use the same solar technology and encompass an area equivalent to the proposed Project site. Construction- and operation-related emissions at the PSPP site were modeled using the AERMOD model (version 07026). Criteria pollutant emissions were modeled to determine maximum air quality impacts. The maximum modeled concentrations were then added to ambient background concentration and compared to the applicable standards. For the PSPP analysis, 3 years of surface observations (2002-2004) from an airport near Blythe, California (approximately 28 miles east of the PSPP site), along with concurrent upper air data from Mercury Desert Rock Airport in Mercury, Nevada (approximately 25 miles east of the proposed Project site), were used for dispersion modeling.

4.1.1 Proposed Action

4.1.1.1 Construction Phase Inventory and Emissions

Construction of the proposed Project is expected to require 39 months. During construction, emissions will be similar to those associated with any large industrial construction project. Construction activities will be staged to provide an efficient strategy for Project construction. Construction-related air emissions will include exhaust and fugitive dust from vehicle and construction equipment, windblown fugitive dust from grading, and other soil disturbing activities and the installation of the solar panels.

Construction-related emissions would be transient in nature and may cause some unavoidable, localized short-term impacts. Since the Project surface disturbance will exceed 5 acres, a Class II Air Quality Permit for Surface Area Disturbance (SAD) will be required. The SAD permit can be a stand-alone permit if the facility began grading prior to the stationary air permit being issued, or it can be part of the stationary air permit (Phillips, personal communication, November 11, 2009).

Table 4-1 summarizes projected maximum daily emissions during construction of the Project. Table 4-2 summarizes projected maximum annual emissions from Project construction.

Table 4-1 Maximum Daily Construction Emissions

Phase of Construction	NOx (lb/day)	VOC (lb/day)	CO (lb/day)	SO2 (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Power Plant (on-site)	826	89	475	1.81	312	93
Power Plant (off-site)	327	76	815	1.32	143	35
Roadway (off-site)	72.8	6.7	36.1	0.1	11.7	4.6
Source: AECOM 2009						

Table 4-2 Maximum Annual Construction Emissions

Phase of Construction	NOx (tpy)	VOC (tpy)	CO (tpy)	SO2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Power Plant (on-site)	102	11.0	58	0.22	38.4	11.4
Power Plant (off-site)	36.4	8.6	91	0.15	16.1	4.0
Source: AECOM 2009						

The exhaust emission factors used for the calculations of CO, VOC, NO_x, SO_x, and PM_{10} are model year and horsepower-based off-road emission factors for 2010, derived from the California Air Resources Board's OFFROAD2007 Model (version 2.0.1.2, December 15, 2007). The OFFROAD2007 Model calculates total daily emissions by equipment category (crane,

dozer, grader, etc.), type of fuel (diesel, gasoline, etc.), and model year within engine horsepower ranges in a geographic area. The model also calculates activity rate (total operating hours per day) within the geographie area by equipment category, fuel, model year, and horsepower range. The total daily emissions were divided by the total daily operating hours to calculate emission factors (in pounds per hour) by equipment category, fuel, model year, and horsepower range (AECOM 2009).

4.1.1.2 Operational Phase Inventory and Emissions

Criteria pollutant emissions (i.e., NO_x, SO_x, CO, VOC, PM_{10}, and $PM_{2.5}$) are expected from each power plant unit during normal facility operations. The proposed plant will include two power block units, each of which consists of:

- One 35-MMBtu/hr LPG-fired auxiliary boiler used for start up
- One 35-MMBtu/hr LPG-fired HTF heater used for freeze protection for the HTF
- One 300-Hp diesel-fired emergency fire water pump engine
- One 300-Hp diesel-fired emergency generator engine
- One two-cell wet-cooling tower
- One HTF expansion/ullage system
- Maintenance vehicles

Summaries of emission estimates are provided in the following section. The emissions were calculated for each power plant unit, and the emissions from both power plant units were combined to estimate emissions for the proposed Project.

Auxiliary Boiler Emissions

Combustion of LPG results in the emissions of NO_x, SO_x, CO, VOC, PM_{10}, and $PM_{2.5}$. The assumptions made regarding auxiliary boiler operation used as the basis for emission calculations include:

- One 35-MMBtu/hr boiler per power plant unit, a total of two identical boilers for the Project
- LPG will be the only fuel used by the boilers
- Boilers to be equipped with ultra-low-NO_x burners
- Daily operation of each boiler is limited to 15 hours per day at 25 percent load, and 2 hours per day at full load
- Annual operation of each boiler is limited to 5,000 hours per year, with a duty eycle of 10 percent at full load and 90 percent at 25 percent load
- 100 percent of the PM_{10} emissions are $PM_{2.5}$
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions, because the auxiliary boilers will not utilize add-on controls

Based on maximum annual operation, the boilers will operate at an average capacity factor of 18.6 percent. The fuel will be commercial grade LPG; the typical composition would be 97.5

percent propane and 2.5 percent butane. Boiler criteria pollutant emissions for a single boiler are shown in Table 4-3.

Table 4-3 Auxiliary Boiler Criteria Pollutant Emissions

Pollutant	Average Hourly Emissions (AHU/AHC) (lb/hr)	Maximum Hourly Emissions (MHU/MHC) (lb/hr)	Maximum Daily Emissions (MDU/MDC) (lb/day)	Annual Average Emissions (AA) (lb/yr)	30-Day Average Emissions (30-DA) (lb/day)
NO_x	0.07	0.39	2.24	632	2.24
VOC	0.03	0.18	1.01	284	1.01
CO	0.24	1.31	7.56	2,137	7.56
PM_{10}	0.06	0.35	2.01	569	2.01
$PM_{2.5}$	0.06	0.35	2.01	569	2.01
SO_x	0.03	0.40	2.27	283	2.27

AHU = Average hourly uncontrolled emissions
AHC = Average hourly controlled emissions
MHU = Maximum hourly uncontrolled emissions
MHC = Maximum hourly controlled emissions
MDU = Maximum daily uncontrolled emissions
MDC = Maximum daily controlled emissions
Source: AECOM 2009

HTF Heater Emissions

Combustion of commercial grade LPG results in the emissions of NOx, SOx, CO, VOC, PM_{10}, and $PM_{2.5}$. The assumptions made regarding HTF heater operation used as the basis for emission calculations include:

- One 35-MMBtu/hr HTF heater per power plant unit, a total of two identical HTF heaters for the Project
- LPG will be the only fuel used by the heaters
- Heaters will be equipped with ultra-low NO_x burners
- Operation of each heater is limited to 10 hours per day and 500 hours per year
- 100 percent of the PM_{10} emissions are $PM_{2.5}$
- Maximum uncontrolled emissions are equivalent to maximum controlled emissions, because the HTF Heaters do not have add-on controls

Based on 500 hours per year of operation at full load, the heaters will operate at an average capacity factor of 5.7 percent. The fuel will be commercial grade LPG. HTF heater criteria pollutant emissions for a single heater are shown in Table 4-4.

Table 4-4 HTF Heater Criteria Pollutant Emissions					
Pollutant	**AHU/AHC (lb/hr)**	**MHU/MHC (lb/hr)**	**MDU/MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
NO_x	0.02	0.39	3.89	194	3.89
VOC	0.010	0.18	1.75	88	1.8
CO	0.08	1.31	13.15	657	13
PM_{10}	0.020	0.35	3.50	175	3.50
$PM_{2.5}$	0.020	0.35	3.50	175	3.50
SO_x	0.02	0.40	3.96	198	3.96
Source: AECOM 2009					

Emergency Diesel-Fired Engine Emissions

Combustion of diesel fuel results in the emissions of the criteria pollutants. The assumptions made regarding emergency engine operation used as the basis for emission calculations include:

- One 300-Hp diesel-fired fire water pump engine per power plant unit, a total of two identical fire water pump engines for the Project
- One 300-Hp diesel-fired emergency generator engines per power plant unit, a total of two emergency generator engines for the Project
- All engines will use ultra-low sulfur (15 ppm) diesel fuel
- All engines have Tier 3 Certification
- The diesel fire water pump hours for each engine are based on a single 1-hour test per week, not to exceed 50 hours per year, and do not reflect emergency use
- The diesel fire emergency generator hours for each engine are based on one 1-hour test per week, not to exceed 50 hours per year, and do not reflect emergency use
- 100 percent of the PM_{10} emissions are $PM_{2.5}$
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions, because emergency engines do not have add-on controls

Emission estimates for NOx, CO, VOC, and PM_{10} are based on emission factors for EPA Tier 3 certified engines. Emission estimates for SO_x are based on estimated fuel use of 15.3 gallons per hour for each engine with a heating value of 137,000 Btu per gallon and fuel sulfur content of 15 ppm. Fire water pump engine criteria pollutant emissions are shown in Table 4-5 and the emergency generator criteria pollutant emissions are shown in Table 4-6.

Table 4-5 Fire Pump Engine Criteria Pollutant Emissions					
Pollutant	**AHU/AHC (lb/hr)**	**MHU/MHC (lb/hr)**	**MDU/MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
NO_x	1.07E-02	1.88	1.88	94.16	1.88
VOC	5.66E-04	0.10	0.10	4.96	0.10
CO	9.81E-03	1.72	1.72	85.90	1.72
SO_x	5.66E-04	0.10	0.10	4.96	0.10
PM_{10}	5.66E-04	0.10	0.10	4.96	0.10
$PM_{2.5}$	1.89E-05	0.003	0.003	0.17	0.003
Source: AECOM 2009					

Table 4-6 Emergency Generator Engine Criteria Pollutant Emissions					
Pollutant	**AHU/AHC (lb/hr)**	**MHU/MHC (lb/hr)**	**MDU/MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
NO_x	1.07E-02	1.88	1.88	94.16	1.88
VOC	5.66E-04	0.10	0.10	4.96	0.10
CO	9.81E-03	1.72	1.72	85.90	1.72
SO_x	5.66E-04	0.10	0.10	4.96	0.10
PM_{10}	5.66E-04	0.10	0.10	4.96	0.10
$PM_{2.5}$	1.89E-05	0.003	0.003	0.17	0.003
Source: AECOM 2009					

Cooling Tower PM_{10} Emissions

The solar power plant will utilize dry-cooling for the primary steam cycle, but will employ an auxiliary cooling tower to remove residual heat from the Balance of Plant equipment. Because cooling towers provide direct contact between the cooling water and the air passing through the tower, some of the liquid water may be entrained in the air stream and be carried out of the tower as "drift" droplets. PM_{10} is generated when the drift droplets evaporate and leave $PM_{2.5}$ formed by precipitation/crystallization of dissolved solids. Dissolved solids found in cooling tower drift can consist of mineral matter and chemicals used for corrosion inhibition.

The assumptions made regarding cooling tower operations that were used as the basis for the emission calculations include:

- One cooling tower unit per power plant unit, a total of two cooling tower units for the Project
- Circulation rate of 6,034 gallons per minute

- Cooling tower blowdown will contain a maximum of 2,000 milligrams per liter (mg/L) TDS
- Each cooling tower will be equipped with a drift eliminator with drift losses of less than or equal to 0.0005 percent by weight based on circulation flow rate
- Each cooling tower will have a maximum run time of 16 hours per day and 3,700 hours per year
- 100 percent of the PM formed is $PM_{10}/PM_{2.5}$
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions, because the cooling tower drift eliminators are integral to the operation of the cooling towers and are not treated as add-on controls

PM emissions are calculated according to the method described in EPA's Compilation of Air Pollutant Emission Factors (AP-42), Section 13.4 Wet-Cooling Towers. Cooling tower PM_{10} emissions are shown in Table 4-7.

Table 4-7 Cooling Tower PM_{10} Emissions

Pollutant	AHU/AHC (lb/hr)	MHU/MHC (lb/hr)	MDU/MDC (lb/day)	AA (lb/yr)	30-DA (lb/day)
PM_{10}	0.013	0.030	0.48	111.8	0.48
$PM_{2.5}$	0.013	0.030	0.48	111.8	0.48
Source: AECOM 2009					

HTF Ullage System Vent Emissions

The total uncontrolled VOC emissions from the HTF expansion/ullage tank vent were estimated based on data provided by an existing solar plant (Kramer Junction SEGS facility), extrapolated to account for HTF system size. The assumptions made regarding HTF Expansion Tank operation that were used as the basis for the emission calculations include:

- One HTF ullage system per power plant unit
- The VOC emissions are controlled with the use of two carbon adsorption canisters in series, with an overall control efficiency of 98 percent
- VOC emissions are limited to a maximum 0.75 lb/hr or 1.5 lb/day after pollution control
- The HTF ullage system are vented for a maximum of 2 hours per day
- The maximum annual operation is estimated at 400 hours per year.

The controlled and uncontrolled emissions are presented in Table 4-8. For these emission estimates, it is assumed that there will no VOC emissions from waste load out of heavy ends from the ullage system as the heavy ends are expected to have a vapor pressure that is substantially lower than the HTF fluid itself, and the vapor pressure of HTF at ambient conditions is negligible.

Table 4-8 HTF Vent VOC Emissions for One HTF Ullage System Vent							
AHU (lb/hr)	**AHC (lb/hr)**	**MHU (lb/hr)**	**MHC (lb/hr)**	**MDU (lb/day)**	**MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
1.71	0.034	37.50	0.75	75.00	1.50	300	1.50
Source: AECOM 2009							

VOC Emissions from Bioremediation

The facility will use bioremediation in an on-site land farm to remediate HTF-contaminated soils. Bioremediation will be conducted at ambient temperatures. At ambient temperatures, the vapor pressure of the HTF is negligible; therefore, the expected VOC emissions are negligible and have not been estimated for this application.

Fugitive VOC emissions may occur in the HTF piping in the solar field from fugitive components such as pumps, seals, flanges, and valves. The fugitive VOC emissions are estimated based on component count data obtained from a recent AFC filed for a solar facility (the Beacon Solar Energy Plant), extrapolated to account for the relative difference in Project (HTF system) size. The assumptions made for the fugitive emission calculations include:

- Fugitive emissions can occur 24 hours per day, 365 days per year
- Fugitive emissions only consist of VOCs
- Maximum controlled emissions are equivalent to maximum uncontrolled emissions, because the fugitive emissions are not controlled

The fugitive pollutant emission factors were taken from the EPA 1995 Protocol for Equipment Leak Emission Estimates for Oil and Gas Production. Since the HTF has a very low vapor pressure, the values for Heavy Oil were used to estimate the emissions. The fugitive emissions are presented in Table 4-9.

Table 4-9 HTF Fugitive Emissions					
Pollutant	**AHU/AHC (lb/hr)**	**MHU/MHC (lb/hr)**	**MDU/MDC (lb/day)**	**AA (lb/yr)**	**30-DA (lb/day)**
VOC	0.18	0.18	4.38	1,598	4.38
Source: AECOM 2009					

Maintenance Vehicle Emissions

The facility will require periodic vehicle travel over the unpaved portions of the solar field to perform routine maintenance, including mirror washing, maintenance inspections and repairs of the piping network, herbicide application, and dust suppressant application. Criteria pollutant emissions are expected from the combustion of fuels in the vehicles, and fugitive PM emissions are expected from vehicle traffic on unpaved surfaces in the solar fields.

The emissions were calculated as the anticipated vehicle miles traveled multiplied by an emission factor for each pollutant. The fugitive PM_{10} and $PM_{2.5}$ emission factors take into account entrained unpaved road dust. Vehicle emissions are shown in Table 4-10.

Table 4-10 Motor Vehicle Criteria Pollutant Emissions for Travel on One Power Plant Unit

Vehicle	Average Hourly Uncontrolled Emissions (lb/hr)								
	CO	VOC	NO_x	SO_x	Exhaust PM_{10}	Fugitive PM_{10}	Diesel PM	Exhaust $PM_{2.5}$	Fugitive $PM_{2.5}$
Mirror Wash Truck	0.003	0.001	0.010	0.000	0.000	0.156	0.000	0.000	0.033
Weed Abatement	0.001	0.000	0.002	0.000	0.000	0.035	0.000	0.000	0.007
Soil Stabilizer	0.001	0.000	0.002	0.000	0.000	0.035	0.000	0.000	0.007
Water Trucks	0.001	0.000	0.004	0.000	0.000	0.064	0.000	0.000	0.013
Maintenance Vehicles	0.052	0.004	0.007	0.000	0.000	1.196	0.000	0.000	0.254
Total	**0.058**	**0.005**	**0.025**	**0.000**	**0.000**	**1.486**	**0.000**	**0.000**	**0.314**
Vehicle	**Maximum Hourly Uncontrolled Emissions/Maximum Hourly Controlled Emissions (lb/hr)**								
	CO	**VOC**	**NO_x**	**SO_x**	**Exhaust PM_{10}**	**Fugitive PM_{10}**	**Diesel PM**	**Exhaust $PM_{2.5}$**	**Fugitive $PM_{2.5}$**
Mirror Wash Truck	0.045	0.012	0.159	0.000	0.007	2.370	0.007	0.006	0.503
Weed Abatement	0.045	0.012	0.159	0.000	0.007	2.370	0.007	0.006	0.503
Soil Stabilizer	0.045	0.012	0.159	0.000	0.007	2.370	0.007	0.006	0.503
Water Trucks	0.029	0.008	0.103	0.000	0.004	1.525	0.004	0.004	0.323
Maintenance Vehicles	0.078	0.006	0.010	0.000	0.001	1.794	0.000	0.001	0.380
Total	**0.242**	**0.05**	**0.59**	**0.000**	**0.026**	**10.429**	**0.011**	**0.023**	**2.212**
Vehicle	**Maximum Daily Uncontrolled Emissions/Maximum Daily Controlled Emissions (lb/day)**								
	CO	**VOC**	**NO_x**	**SO_x**	**Exhaust PM_{10}**	**Fugitive PM_{10}**	**Diesel PM**	**Exhaust $PM_{2.5}$**	**Fugitive $PM_{2.5}$**
Mirror Wash Truck	0.357	0.094	1.276	0.001	0.055	18.961	0.055	0.051	4.020
Weed Abatement	0.357	0.094	1.276	0.001	0.055	18.961	0.055	0.051	4.020
Soil Stabilizer	0.357	0.094	1.276	0.001	0.055	18.961	0.055	0.051	4.020
Water Trucks	0.029	0.008	0.103	0.000	0.004	1.525	0.004	0.004	0.323
Maintenance Vehicles	1.255	0.094	0.157	0.002	0.010	28.699	0.000	0.009	6.085
Total	**3.996**	**.384**	**4.088**	**0.005**	**.179**	**87.107**	**.169**	**.166**	**18.468**

Table 4-10 Motor Vehicle Criteria Pollutant Emissions for Travel on One Power Plant Unit

Vehicle	Average Annual (lb/yr)								
	CO	VOC	NO_x	SO_x	Exhaust PM_{10}	Fugitive PM_{10}	Diesel PM	Exhaust $PM_{2.5}$	Fugitive $PM_{2.5}$
Mirror Wash Truck	25.7	6.8	91.9	0.1	4.0	1,365.2	4.0	3.6	289.5
Weed Abatement	5.7	1.5	20.4	0.0	0.9	303.4	0.9	0.8	64.3
Soil Stabilizer	5.7	1.5	20.4	0.0	0.9	303.4	0.9	0.8	64.3
Water Trucks	10.5	2.8	37.5	0.0	1.6	556.6	1.6	1.5	118.0
Maintenance Vehicles	458.0	34.3	57.2	0.6	3.6	10,475	0.0	3.3	2,221.1
Total	**505.6**	**46.9**	**227.4**	**0.7**	**11.0**	**13,003.6**	**7.4**	**10.0**	**2,757.2**
Vehicle	**30-Day Average (lb/day)**								
	CO	VOC	NO_x	SO_x	Exhaust PM_{10}	Fugitive PM_{10}	Diesel PM	Exhaust $PM_{2.5}$	Fugitive $PM_{2.5}$
Mirror Wash Truck	0.357	0.094	1.276	0.001	0.055	19.0	0.055	0.051	4.02
Weed Abatement	0.357	0.094	1.276	0.001	0.055	19.0	0.055	0.051	4.02
Soil Stabilizer	0.357	0.094	1.276	0.001	0.055	19.0	0.055	0.051	4.02
Water Trucks	0.029	0.008	0.103	0.000	0.004	1.5	0.004	0.004	0.32
Maintenance Vehicles	1.255	0.094	0.157	0.002	0.010	28.7	0.000	0.009	6.09
Total	**2.355**	**.384**	**4.088**	**0.005**	**1.79**	**87.2**	**.169**	**.166**	**18.47**

Source: AECOM 2009

Off-site Delivery Vehicles

Deliveries of various supplies, materials, and services to the facility will occur on a regular basis. These deliveries will result in additional truck travel on paved roads. The combustion of fuel in offsite delivery vehicle engines results in the generation of CO, VOC NO_x, SO_x, PM_{10}, and $PM_{2.5}$ emissions. Motor vehicle brake and tire wear and travel on paved roads with entrained road dust results in the generation of fugitive PM_{10} and $PM_{2.5}$ emissions. The assumptions made regarding the off-site vehicle emissions from LPG and other deliveries for the Project used as the basis for emission calculations include:

- Up to 10 miscellaneous deliveries to the facility per month (120 trips per year)
- LPG delivery is based on maximum boiler and HTF heater usage at both power plant units
- A LPG delivery truck can hold 8,000 gallons of LPG
- The LPG and other miscellaneous suppliers are located in Pahrump and Las Vegas
- The delivery trucks are heavy-duty diesel-fueled vehicles

Off-site delivery vehicle criteria pollutant emissions are shown in Table 4-11.

Table 4-11 Off-site Motor Vehicle Criteria Pollutant Emissions

Vehicle	Daily (lb/day)								
	CO	VOC	NO_x	SO_x	Exhaust PM_{10}	Fugitive PM_{10}	Diesel PM	Exhaust $PM_{2.5}$	Fugitive $PM_{2.5}$
Propane Delivery	2.74	0.72	9.79	0.01	0.42	0.30	0.42	0.39	0.06
Miscellaneous Delivery	5.48	1.45	19.58	0.02	0.84	0.61	0.84	0.78	0.11
Total	**8.22**	**2.17**	**29.37**	**0.03**	**1.26**	**0.91**	**1.26**	**1.17**	**0.17**
Vehicle	**Annual (lb/yr)**								
	CO	**VOC**	**NO_x**	**SO_x**	**Exhaust PM_{10}**	**Fugitive PM_{10}**	**Diesel PM**	**Exhaust $PM_{2.5}$**	**Fugitive $PM_{2.5}$**
Propane Delivery	556.5	146.8	1,989.0	2.2	85.6	61.5	85.6	78.8	11.7
Miscellaneous Delivery	328.6	86.7	1,174.5	1.3	50.6	36.3	50.6	46.5	6.9
Total	**885.1**	**233.5**	**3,163.5**	**3.5**	**136.2**	**97.8**	**136.2**	**125.3**	**18.6**
Source: AECOM 2009									

Summary of Operational Criteria Pollutant Emissions

The total criteria pollutant emissions for the Project are summarized in Table 4-12.

Table 4-12 Summary of Project Criteria Pollutant Emissions

Emission Period (units)	Pollutant (includes stationary and mobile sources)					
	NO_x	VOC	CO	PM_{10}	$PM_{2.5}$	SO_x
AHU (lb/hr)	0.26	3.88	0.73	1.68	0.51	0.11
AHC (lb/hr)	0.26	0.53	0.73	1.68	0.51	0.11
MHU (lb/hr)	9.36	76.49	12.28	7.56	3.07	1.60
MHC (lb/hr)	9.36	2.99	12.28	7.56	3.07	1.60
MDU (lb/day)	21.32	164.86	49.93	61.64	22.88	12.47
MDC (lb/day)	21.32	17.86	49.93	61.64	22.88	12.47
AA (lb/yr)	2,256	4,607	6,437	14,745	4,498	576
30-DA (lb/day)	21.32	17.86	49.93	61.64	22.88	12.47
Source: AECOM 2009						

Although new PM_{10} emissions are predicted due to operation of this Project, the solar plant could potentially reduce overall PM_{10} emissions in this region. By its nature, a solar energy project must keep dust to a minimum through the use of dust control measures, as a film of dust on the mirrors will reduce their efficiency for power production. Experience at other existing solar facilities has been that PM_{10} emissions from driving in the solar field are negligible. Dust control is achieved by a combination of watering, soil stabilizers, water from the mirror washing, and compaction of the driving surface over time. These control measures will be utilized by the proposed Project. Therefore, the emission estimates and impact analyses for PM_{10} and $PM_{2.5}$ should be considered very conservative (i.e., an over-estimate of emissions and corresponding impacts).

The proposed Project will be a minor source of criteria pollutant emissions from facility operation (e.g., emissions from auxiliary boilers and heaters, emergency generators, on-site maintenance traffic, etc.). However, controlled emissions sources would not exceed major source thresholds for any pollutant. Upon completion of final engineering design, the Proponent will consult with the NDEP – BAPC to obtain required air quality permits. The facility will require either a Class I Air Quality Operating Permit (if emissions from PM_{10}, NO_x, CO, SO_2, and VOC exceed 100 tons per year), or a Class II Air Quality Operating Permit, if emissions of these constituents are less than 100 tons per year.

4.1.2 Wet-Cooled Alternative

Impacts to air quality from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative). The primary differences is the additional PM_{10} and $PM_{2.5}$ emissions from the cooling tower associated with a wet-cooled plant due to solids in the entrained moisture in the cooling tower drift. Because wet-cooling towers provide direct contact between the cooling water and the air passing through the tower, some of the liquid water may be entrained in the air stream and carried out of the tower as "drift" droplets. PM_{10} is generated when the drift droplets evaporate and leave fine particulate matter formed by precipitation/crystallization of dissolved solids. Dissolved solids found in cooling tower drift can consist of mineral matter, chemicals used in corrosion inhibition, etc. The assumptions made regarding cooling tower operation that are used as the basis of the emissions calculations for the wet-cooling alternative are as follows:

- Circulation rate of 149,000 gallons per minute;
- Cooling tower blowdown will contain a maximum of 1,600 mg/L TDS assuming 15 cycles of concentration;
- The cooling tower will be equipped with a drift eliminator with drift losses of less than or equal to 0.0005 per cent by weight based on the circulation flow rate;
- The cooling tower run time will be 16 hours per day and 3700 hours per year; and
- 100 percent of the TDS is PM_{10}/ $PM_{2.5}$ emissions.

In contrast the auxiliary cooling tower for the dry-cooled alternative will use demineralized makeup water. The assumptions made regarding auxiliary cooling tower operation that are used as the basis of the emissions calculations for the dry-cooling alternative are as follows:

- One auxiliary cooling tower per power unit, a total of two cooling towers per project site,
- Circulation rate of 6,034 gallons per minute;
- Cooling tower blowdown will contain a maximum of 2,000 mg/L TDS;
- The cooling tower will be equipped with a drift eliminator with drift losses of less than or equal to 0.0005 per cent by weight based on the circulation flow rate;
- The cooling tower run time will be 16 hours per day and 3700 hours per year; and
- 100 percent of the TDS is PM_{10}/ $PM_{2.5}$ emissions.

Table 4-13 Comparison of Cooling Tower PM_{10} Emissions

	Wet-Cooled Alternative			Dry-Cooled Alternative		
Pollutant	**Hourly (lb/hr)**	**Daily (lb/day)**	**Annual (tpy)**	**Hourly (lb/hr)**	**Daily (lb/day)**	**Annual (tpy)**
PM_{10}	0.013	0.48	0.0559	0.60	9.55	1.74
$PM_{2.5}$	0.013	0.48	0.0559	0.60	9.55	1.74

4.1.3 No Action Alternative

Under the No Action Alternative, there would be no impacts from construction and operation of the proposed Project to air quality.

4.1.4 Mitigation

No additional mitigation required at this time. Following consultation with the NDEP on the final project design, additional compliance measures may be required as part of their permit and approval process.

4.2 Geological Hazards and Mineral Resources

This section describes and evaluates the impacts that geological hazards may have on the Proposed Action. This section also describes and evaluates the potential impacts on mineral resources that may result from the Proposed Action.

4.2.1 Proposed Action

4.2.1.1 Geological Hazards

The potential for earthquakes and ground subsidence in the Project area is low, but not non-existent. Ground-shaking as a result of earthquakes represents the most significant geological hazard to the Proposed Action. Earthquakes have been recorded near the Project area and can be expected to occur in the future at essentially the same magnitude and frequency that have been previously recorded. Seismicity is a measure of the ground-shaking that is likely to occur in a given area as a result of earthquakes. The construction, operation, and maintenance of the proposed Project would not directly or indirectly impact earthquakes within the Project area or alter the seismicity in the vicinity of the Project area. While the Proposed Action would not affect earthquakes or seismicity in the Project area, earthquakes and the seismicity of the local area may potentially impact the proposed Project.

Quaternary faults have been mapped within the Project area (Slate et al. 1999). A fault crosses the southeastern portion of the Project area. A second fault crosses within .5-mile of the southwestern edge of the Project area. The construction, operation, and maintenance of the Proposed Action would not directly or indirectly impact Quaternary faults within the Project area.

Ground subsidence is the sinking or downward motion of the earth's surface resulting from either natural or manmade processes, such as mining, oil and gas extraction, or groundwater withdrawal (Bates and Jackson 1987). Local withdrawal of groundwater may result in ground subsidence by removing water from the pore spaces of consolidated sediments. As groundwater is removed, unoccupied pore spaces may eollapse, thereby decreasing the total volume of the geological unit, which may cause the land surface to drop. Katzenstein and Bell (2005) observed 2.5 to 3.5 centimeters of ground subsidence in Amargosa Valley, which was in close proximity to areas of groundwater withdrawal.

The construction, operation, and maintenance of the proposed Project would not directly or indirectly impact ground subsidence within the Project area. The dry-cooling method as proposed will not increase the amount of groundwater being removed from the local area. As withdrawal of groundwater is the main cause of ground subsidence, it is unlikely that subsidence will continue to a degree that the facility will be damaged. Section 4.2.4 (Mitigation) lists subsidence as one of the geological factors that would be considered in the design and construction of the facility.

4.2.1.2 Unique Geological Resources

Unique geological resources will not be impacted by the proposed Project, because there are no known unique geological resources associated with the Project area. The nearest unique geological resource to the Project area is the Big Dune ACEC. As the Big Dune ACEC is approximately 4 miles from the Project area, and as there is no evidence of the Big Dune moving out of the ACEC, it is unlikely that the proposed Project will have any impacts to the Big Dune ACEC.

4.2.1.3 Mineral Resources

The primary impact issue for mineral resources is the loss of economically significant mineral resources. Two types of impact can potentially affect mineral resources:

1. Direct and permanent disturbance of the mineral-resource host rock during construction

2. Indirect and permanent disturbance due to changes in public accessibility to mineral resources

The primary cause of direct and permanent disturbance of mineral resources is ground disturbance associated with the Proposed Action, such as grading and cutting of roads and excavation for building foundations, which may damage or remove the geological units that host the mineral resources.

Given the absence of currently active mining or known mineral resources in the Project area, the potential impact to mineral resources is considered low. Nevertheless, indirect and permanent disturbance of mineral resources will be caused by the loss of mining-claim eligibility within the Project area. The mineral resource inventory found a single defunct placer mining claim within the Project area, which demonstrates past interest and the potential for future interest in placer-mineral resources within the Project area.

4.2.2 Wet-Cooled Alternative

Impacts to geological resources and mineral resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).

4.2.3 No Action Alternative

Under the No Action Alternative, there would be no impacts from geological hazards or Project-related impacts to mineral resources.

4.2.4 Mitigation

Impacts from geological hazards or to mineral resources are expected to be minor. Site-specific geotechnical, seismic, and soil conditions will be appropriately addressed during the design and construction of the Project. In accordance with the National Electrical Safety Code, the Proponent would design and construct the Project facilities to withstand geological hazards by taking earthquake activity, seismicity, fault locations, and ground subsidence into consideration. Therefore, geological hazards in the Project area are expected to have a minimal impact on Project facilities.

4.3 Soils

4.3.1 Proposed Action

4.3.1.1 Soil Loss

Erosion is the loss of soil through the natural action of water and wind. Construction activities may affect the rate at which water and wind erosion act on soils within the Project area, which may lead to loss of soil, damage to the Project Area, or damage to the surrounding area. By understanding how the Proposed Action will affect the soil units within the Project area, measures will be implemented to mitigate any impacts.

4.3.1.2 Water Erosion

The runoff designations for the soils affected by the construction, operation, and maintenance of the proposed Project range from negligible (Arizo) to rapid (Yermo). Soils within the Project area exhibit rapid permeability, with the exception of the moderately permeable Sanwell series. Given the climatic characteristics, low potential for precipitation, and the rarity of flooding events within the Project area, the implementation of BMPs would limit soil loss due to water erosion.

4.3.1.3 Wind Erosion

The soils within the Project area exhibit a moderate susceptibility for wind erosion. The dominant soil series within the Project area, the Yermo series, is assigned to a WEG of 5. The least extensive soil series within the Project area, the Lewdlac series, exhibits a moderate-high susceptibility to wind erosion and is assigned to a WEG of 3. Watering of active construction areas, such as grading of power blocks and cutting of roads, is expected to reduce susceptibility to wind erosion, consequentially reducing wind-blown, fugitive dust.

4.3.1.4 Farmland

Capability class is a broad classification scheme used to describe limitations of soils. All soil-mapping units within the Project area are assigned to a non-irrigated capability class of 7; whereas the Yermo and Shamock series have been assigned an irrigated capability class of 4. A capability class of 7 represents very severe limitations for vegetation growth that make a soil unsuited for cultivation; whereas a capability classification of 4 represents very severe limitations for vegetation growth that require careful management to support crops. No soil-mapping units within the Project area have been designated as prime farmland, unique farmland, or farmland of statewide importance.

4.3.2 Wet-Cooled Alternative

Impacts to soil resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described below for the Proposed Action (dry-cooled alternative). However, the amount of ground disturbance would be greater as one 23-acre evaporation ponds per 242 MW power block would be required for the wet-cooled alternative.

4.3.3 No Action Alternative

Under the No Action Alternative, there would be no Project-related impacts to soil resources.

4.3.4 Mitigation

Proper mitigation measures would be required during construction of the proposed Project in order to avoid or minimize damage resulting from erosion, prevent acceleration of natural-erosion processes, and reduce the creation of fugitive dust that may affect both the Project and surrounding area. Temporary mitigation measures will be implemented during Project construction and then replaced with permanent measures upon completion of the proposed Project. Permanent mitigation measures will be maintained throughout the lifespan of the proposed Project. These mitigation measures are detailed in Appendix A.

4.4 Water Resources

For both the wet- or dry-cooled alternatives, the Proponent would either lease or purchase existing certified water rights for water needs during construction and operation of the proposed Project. Water rights would be acquired from existing water right owner(s), as no new appropriations are granted by NDWR due to Order 1197.

As described in Chapter 3.4, GeoTrans, Inc. was contracted to develop a groundwater flow model and hydrographic analysis to compare how historic and future pumping (up to 200 years) in the Amargosa Desert Hydrographic Basin, coupled with conversion of 400 afy of water rights from agricultural use to industrial use, would affect water levels in Devils Hole.

A numerical groundwater flow model was used to evaluate the potential regional effects to water resources associated with the proposed groundwater development included in the Proposed Action (400 afy). The groundwater report is provided in Appendix B.

Scenario 1 (No Action) Results

For Scenario 1 (No Action), 2003 pumping and return flow was repeated every year for the next 200 years to determine the change in water levels at Devils Hole. The model results show that drawdown is predicted to be more than 5 foot over a large area. However, the drawdown is predicted to decrease rapidly in the Ash Meadows discharge area. The drawdown is buffered by the reduction in spring discharge that occurs with declines in water level.

Simulated water levels in Devils Hole after 200 years of pumping, show a decline of over 13 feet due to existing pumping in the Amargosa Desert Hydrographic Basin. "Time zero" is assumed to be the simulated water-level elevation on December 31, 2003 from the model, not pre-development conditions.

Scenario 2 (Proposed Action) Results

For the Proposed Action, the 400 afy of groundwater withdrawal was divided between the three Project wells. Pumping from these three wells is assumed to start in 2010 and concludes in 2039 since the Project life is expected to be 30 years. Table 4-14 shows the proportion of pumping between the three wells. All wells were pumped from Layer 1 in the model since Layer 1 was thicker than the depth of any of the three wells.

Table 4-14 Proposed Groundwater Withdrawal from Project Wells

App. No.	Easting (m)	Northing (m)	Duty (afy)	Proposed w/d (afy)	Model Right-of-Way	Model Column	Model Layer
15702	542358.48	4045750.11	175	53	116	71	1
15893	542362.42	4044948.68	603	183	116	71	1
43873	542762.50	4044550.36	545.38	164	117	71	1

An additional 400 afy of pumping reduces simulated water levels at Devils Hole by less than 0.05 of a foot or 0.6 of an inch after 200 years. It is important to keep in mind that this reduction in water levels is approximately 30 percent higher due to the model overpredicting water level declines at Devils Hole historically. The DVRFS model calibration to hydraulic head change is also not accurate to 0.05 feet. The DVRFS model report considers the model fit to hydraulic heads to be good if the difference between simulated and observed hydraulic heads is less than 10 meters (Belcher, 2004). Also, the DVRFS model is not designed to exactly measure drawdown at a spring location several miles away, such as Devils Hole, because of its 1) grid size [1,500 meters x 1,500 meters], 2) emphasis on calibration to regional groundwater conditions, 3) estimates in historic pumping dataset, and 4) simplification of geology. Thus, the regional model has a limited capability to accurately evaluate incremental changes in pumping tens of miles away on Devils Hole; however, it is the only groundwater flow model available.

Recently, groundwater withdrawal from the three Project wells (e.g., from 2005 to 2007) has been reported as 1,328 afy, the full duty. The Project withdrawal of 400 afy should result in a minimal effect on Devils Hole water levels, in addition to the existing pumping in the basin. The water rights owners will use 928 afy for agriculture and 400 afy will be used for the Project. There will be a small difference between conversions from an agricultural to industrial beneficial use; however, it is impossible to quantify how much recharge, if any, will be derived from mirror washing. Studies have been performed on irrigation return flow adjacent to the property (Stonestrom et al. 2003, 2007), but give a range of values for recharge from two different methods: 1) 0.1 to 0.5 meter/year (4 to 20 inches/year) from vertical profiles of water potential and environmental tracers; and 2) 9 to 22 percent of infiltrated irrigation from chloride mass-

balance estimates. The reason the model does not show zero water-level change at Devils Hole due to Project pumping is due to the USGS estimate for 2003 groundwater withdrawal from the three wells being lower than 928 afy.

Ash Meadows Discharge

The potential effects from Project pumping on discharge at Ash Meadows were also evaluated using the DVRFS model. The USGS code ZONEBUDGET was used to evaluate the changes in water movement for the Amargosa Basin. Under the present-day pumping rates, the model predicts that only minor changes to the discharge rate at Ash Meadows would have occurred by 2003, the end of the model calibration period (see Figure 10 in Appendix B). When the present-day pumping is continued into the future (No Action), the model predicts that impacts to the discharge will occur. In 2203, the discharge is predicted to be reduced from approximately 18,095 afy to 15,607 afy. When the Project pumping is added (Proposed Action), the discharge rate in 2203 is predicted to be reduced to only 15,600 afy or a negligible difference of 7 afy or 0.05 percent.

4.4.1 Proposed Action

The water needs for the proposed Project will be met by one of two options: 1) leasing and conveying groundwater from three existing wells located on private land southwest of the Project site; or 2) purchasing existing water rights from the three wells, and moving the point of diversion to the power block areas. The 3 wells under consideration have associated water rights totaling 1,323 afy. It is expected that the 3 wells will adequately serve the proposed Project (under the dry-cooled alternative) on a rotating basis without exceeding their annual pumping average. It is anticipated that 2 wells will be the primary source of water, while the third well would provide redundancy, an inherent backup water supply in the event of outages or maintenance of the other wells.

4.4.1.1 Impacts from Construction

The environmental impacts on water resources resulting from the construction of the proposed Project were analyzed by comparing the current conditions described in Chapter 3.0 to the conditions that would be expected to result from construction as described in Chapter 2.0. The direct effects of the proposed Project on water resources associated with using groundwater for construction, specifically for demands during the site grading and dust control, and operational process water needs and the effects of site grading and re-routing of washes that cross the Project were evaluated to assess the potential environmental impacts.

Construction activities are expected to take place over a period of approximately 39 months. The water to be used during construction will be from the three groundwater wells to be used for the proposed Project. Potable water will be brought in from an off-site source and held in day tanks during the term of construction. Water from groundwater during construction will be used for:

- Dust suppression during grading and along roadways as necessary

- Grading and compaction for the solar field and power block areas, infrastructure, and building foundations
- Concrete work and other uses

The majority of water use will be for grading which will be managed at a steady rate over the construction period. There are no anticipated significant peaks or troughs in the water volume required to support grading activities. Currently, construction plans are to clear and grade the site with heavy equipment to provide a uniform, gently southwesterly sloping grade and to construct drainage channels and roads. The current assumption for grading assumes no import of fill material. Due to the amount of soils and vegetation affected by grading activities, substantial water erosion control and dust control measures will be required to minimize off-site impacts. Overall, the Project will result in disturbance of approximately 4,350 acres at the Project site.

Potential impacts to water resources during construction would be primarily associated with surface disturbing activities, but could also be a result of accidental spills and handling and storage of hazardous chemicals. These chemicals can potentially contaminate surface waters during heavy storm events, or groundwater through infiltration. A number of mitigation measures are proposed to prevent spills of chemicals, as well as to respond to spills should they occur. The site-specific SWPPP will include stormwater BMPs, and temporary erosion control measures including BLM-approved dust suppression, and construction of berms and ditches, which will prevent accelerated soil erosion or dust generation. Adhering to proper material handling procedures and complying with the SWPPP would ensure that construction-related water quality impacts would not occur.

Conceptual Drainage Study

A Draft Conceptual Stormwater Control Plan for the proposed Project is provided in Appendix E. This report was prepared and submitted to the BLM in December 2008 (Slater Hanifan Group 2008). In general, the proposed solar field improvements will change the historic drainage patterns within the boundaries of the Project site. Prior to discharge from the boundaries of the Project site, it is the intent of the drainage design to maintain historic drainage patterns in both quantity and manner of flow in conformance with NRS Chapter 543 following guidelines set forth in Section 400 of the Hydrologic Criteria and Drainage Design Manual.

The site will be graded generally following the existing contours of the site in order to minimize the amount of disturbance and to allow a balanced distribution of material. Flood protection of the property from off-site flows will be provided by means of a continuous channel around the northern and western perimeter of the site. The channel will be designed to effectively intercept the 100-year storm event off-site runoff and convey the concentrated flow to the southwest corner of the property.

The southwest corner of the property has been identified as one of the historic discharge locations of the Fortymile Wash. The channel will discharge within the property limits and energy dissipation facilities will be provided in order to disperse the concentrated flow back to a shallow sheet flow condition prior to leaving the property boundary. Additionally, a channel is proposed along the eastern side of the solar field in order to intercept and collect flows impacting the site from the east. Similar to the northern and western perimeter channels, the concentrated

flow will be released on property in its historic location and an energy dissipation facility will be provided in order to return the flow to a shallow sheet flow condition prior to leaving the property. Perimeter channels are recommended to be concrete lined due to the high velocity potential and for maintenance reasons. Off-site flows will be intercepted and conveyed around the site to ensure no direct contact with on-site stormwater runoff.

Due to the size of the solar field area, the site itself has potential to generate large storm flows during a rain event. For this reason, stormwater control facilities are necessary to protect on-site facilities, and to convey stormwater runoff to historic discharge locations in both quantity and manner of flow. The four primary (major) onsite channels, traversing the site north to south, will provide 100-year event stormwater runoff interception from four equal divisions of the entire project site. The two power block areas are considered to contain the most sensitive equipment on the site and are therefore each located along one of the primary channels; thus achieving flood protection during a 100-year storm event. The stormwater runoff generated between the primary channels will be collected in a series of swales and small channels that will direct the flow to the appropriate primary channel. All minor channels within each section will be designed to intercept and convey the 25-year storm event. Stormwater runoff in areas between the primary channels and in excess of the 25-year event will sheet flow (shallow depth, low velocity) below the solar panel systems; and eventually be intercepted by an appropriate primary channel prior to impacting a power block area. This concept was selected in order to reduce costs for on-site drainage facilities, while still providing desired flood protection.

In addition to conveyance facilities, an on-site detention basin is considered necessary in order to limit post-development flows to pre-development limits. A portion of on-site storm flows will pass through the detention basin prior to off-site discharge, providing a facility for suspended particles to settle. Table 4-15 provides a summary of existing and post-development peak 100-year flow rates at historic discharge locations along the southern perimeter of the site. Locations of the existing and proposed discharge locations are shown in the Draft Conceptual Stormwater Control Plan provided in Appendix E.

Table 4-15 100-Year Storm Even Peak Flow Summary

Comparison Location (Existing/Proposed)	Existing Flow - Q_{100} (cfs)	Post-Development Flow - Q_{100} (cfs)
PT1/PT1	9,596	9,594
PT2/RPT2	129	121
PT3/789	262	133
SUB10/PT4	880	846
SUB11/SUB11	482	482

Source: Slater Hanifan Group 2009

In order to reduce impacts from off-site stormwater runoff, an alternative for Regional Flood Control Facilities was presented to the BLM and Nye County staff. The alternative would provide a regional off-site detention basin at the apex of the Fortymile Wash located north of US 95 and would effectively and considerably reduce existing condition peak storm flow downstream of US 95. Reducing off-site peak flows impacting the site allows for reduction in size of perimeter flood control facilities necessary for protection of the Project site. All properties downstream of the detention basin would benefit from this approach. The Regional Flood Control concept was presented to BLM and Nye County staff in 2009 and is currently under consideration as a viable alternative.

4.4.1.2 Operation

This section describes potential environmental impacts on water resources related to Project operations.

Water Use

Estimated water uses for the proposed dry-cooled project and the wet-cooled project alternative are summarized in Table 2-3, Summary of Operational Water Use. Water from two wells (with backup from a redundant well) will be used for the following consumptive uses:

- Solar mirror wash water to maintain solar collector efficiency
- Power cycle makeup water to supply the steam driving the steam turbine generators (this water is recycled and thus does not really constitute consumptive use)
- Equipment heat rejection for cooling generators, pumps, and other equipment
- Dust suppression
- Domestic potable uses include drinking water, showering, toilets, hand washing, etc

Estimates for water usage are based on:

- Power cycle makeup water and auxiliary equipment heat rejection – expected monthly power production rates
- Solar mirror washing – experience at other locations with similar climatic conditions
- Domestic potable use – number of employees and number of hours expected to be worked during the year; an average consumption of 37 gallons per person per day was assumed
- Dust suppression – concentrate from the water treatment process will be used for this purpose

Water Quality

Operation of the proposed Project has the potential to impact water quality through improper storage and use of materials and from soil erosion. Adhering to proper material storage and handling procedures and complying with the operation SWPPP will result in minor to no impacts to water quality. The SWPPP will identify BMPs to manage pollutant releases, including spill and leak prevention, waste handling, and employee training. Through compliance with the

General Industrial Permit, all potential pollutants generated during the industrial phase will be sufficiently mitigated such that water quality standards will not be violated. Thus, surface water and groundwater quality impacts during the operations phase would be minor.

Process and Sanitary Waste Water Management

The Project will produce one primary wastewater stream, sanitary wastewater. Sanitary wastes will be collected from the power blocks, administration building, and warehouse for treatment in several septic tanks. Septic tanks are the most common method of on-site wastewater treatment and disposal. Liquid effluent from the septic tanks will have biological oxygen demand of approximately 175 mg/L and suspended solids concentration of approximately 75 mg/L. Heavy solids will settle to the bottom of the septic tank, undergo anaerobic decomposition and slight compaction, and will be removed every 3 to 5 years.

Liquid effluent from the septic tanks will be distributed to multiple leach fields (in close proximity to the septic tanks). Based on the current estimate of 180 employees on a 24-hour, 7 day per week work schedule, a total leach field of approximately 16,500 square feet will be required. It is expected that the leach fields will satisfy the needs of the plant for its entire service life. At this time, the leach field is anticipated to be sited adjacent to the bioremediation field. However, the final location will be determined following additional engineering design. The Proponent will coordinate the development of the leach field and bioremediation facility with NDEP as part of their permitting and approval process with that agency.

There are no processes or operational wastewaters that will be connected to the septic system and leach field. The use of a septic system and associated leach field is a well established process and acceptable method of treatment and disposal when there is no local sewer system available, when the local soil and groundwater conditions are acceptable to this method, and when the chemical makeup of the wastewater is not a hazard to the local environment. The local soils are very permeable and the depth to groundwater in this area is generally approximately 135 feet below ground surface. At this depth, the soil overlying a leach field is generally considered sufficient for the biological treatment of domestic wastewater.

The power cycle makeup water will be recycled back into the process at rates between 34,500 and 52,500 gpd for each power block. Other water streams like plant drains and other miscellaneous water waste streams are collected and recycled back into the process.

4.4.2 Wet-Cooled Alternative

Under the wet-cooled alternative, the demand for water would be 4,600 afy, which is substantially more than that required for the Proposed Action (dry-cooled alternative). For both the wet- or dry-cooled alternatives, the Proponent would either lease or purchase existing certified water rights for water needs during construction and operation of the proposed Project. With either a wet- or dry-cooled option, water rights would be acquired from existing water right owner(s), as no new appropriations are granted by NDWR due to Order 1197. Groundwater flow model simulations and a hydrologic analysis have been performed for the dry-cooling option (results presented in Section 4.4.3; report provided in Appendix B). It could be assumed that the

water that would be acquired for the wet-cooled option may still be used on an annual basis by the current water rights owner(s) in the current capacity. Therefore, impacts to nearby water resources would have minimal change if the current 10-year average remains consistent throughout the Project life. The minimal change will be due to the conversion of agricultural water rights to industrial water rights, because of the reduction of return flow from irrigation.

Construction-related impacts on water resources for this alternative would be the same as the Proposed Action (dry-cooled alternative).

4.4.3 No Action Alternative

Under the No Action alternative, the proposed Project would not be constructed, and there would be no effects of construction and operation of the proposed Project on local or regional water resources. However, groundwater would continue to be pumped in the Amargosa Desert Hydrographic Basin and Death Valley regional groundwater flow system with unknown impacts to sensitive water resources area, including Devils Hole and springs and seeps in the Ash Meadows NWR.

4.4.4 Mitigation

Prior to beginning any clearing, grading, or excavation activities associated with construction of the Project, the Project owner will develop and implement an approved construction-phase SWPPP as required under the General Storm Water Construction Activity Permit, as well as implement any other Project-specific mitigation measures required by other agencies (e.g., NDEP, Nye County, USACE). The Project owner will obtain and comply with permits for construction of Project-specific water pipelines or septic system prior to construction of the plant. The Project owner will revise and reclassify well permits, if needed, with the NDWR.

Prior to commercial operation, the Project owner, as required under the General Industrial Activity Storm Water Permit, will develop and implement an operations phase SWPPP. The Project owner will submit required monitoring or compliance reports to appropriate agencies as requested.

4.5 Noise

To determine potential noise impacts of the proposed Project during the construction and daily operations of the facility, a detailed noise model was constructed to evaluate all aspects of significant noise sources on the surrounding residential community. Modeling of the Project site and surrounding environment was accomplished using Cadna (Computer Aided Noise Abatement) Ver. 3.7, which is a model-based computer program developed for predicting noise impacts in a wide variety of conditions. Cadna allows for the input of project information such as noise source data, barriers, structures, and topography to create a detailed CAD model, and uses the most up-to-date calculation standards to predict outdoor noise impacts to property lines and adjacent surrounding areas.

The potential significance of impacts are defined by comparing the projected related noise levels at the adjacent residential land use areas to the EPA outdoor noise guidelines of 55 dBA Ldn. If Project-related noise impacts to the adjacent residential property lines exceed the 55 dBA Ldn noise guidelines established by the EPA, then mitigation is required.

Also, noise impacts to defined outdoor work environments located within the Project site from potential noise sources, such as the power block areas, is defined by the federal OHSA hearing conservation noise exposure regulation. The regulation states that the acceptable OSHA 8-hour Time Weighted Average (TWA) noise threshold limit must not exceed 90 dBA. If an employee or service contractor is shown to be exposed to a noise level of 90 dBA for a continuous 8-hour period, then it shall be necessary to develop and implement a hearing conservation plan to protect the worker during the noise impact condition, thus, satisfying the OSHA requirement.

4.5.1 Proposed Action

4.5.1.1 Construction Noise Impacts

Throughout the construction of the proposed Project, noise impacts from the operation of construction machinery are expected. The temporary construction noise evaluation assesses the anticipated construction noise impacts to the defined property line sensitive receptor locations, and shall be compared to the EPA outdoor guidelines of 55 dBA Ldn.

The construction noise impact analysis is based on a phased construction schedule for the proposed Project which incorporates a total of three distinct construction phases. The following analysis evaluates the three construction phase scenarios and is based upon the noise emission data from the equipment manufacturer and expected operational utilization within each phase. The operation of construction equipment is defined to be conducted between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday.

The noise impact calculations assume worst-case conditions with all equipment running simultaneously. All sound pressure levels within the equipment noise emission database are standardized at a distance of 50 feet from the noise source. The noise evaluation for each phase is based on the construction equipment operating during a 12-hour time period between 7:00 a.m. and 7:00 p.m. The noise generated from the equipment operating during the daytime 12-hour time period is then incorporated into the 24-hour Ldn calculation to determine worst-case construction noise impacts to the sensitive receptor locations. The equipment percent operating use is based on typical land use development construction practices and our professional experience. The noise calculations of each phase will provide a realistic prediction of the noise impact range to be expected from typically intermittent construction equipment operations.

Phase 1 - Project Site Grading

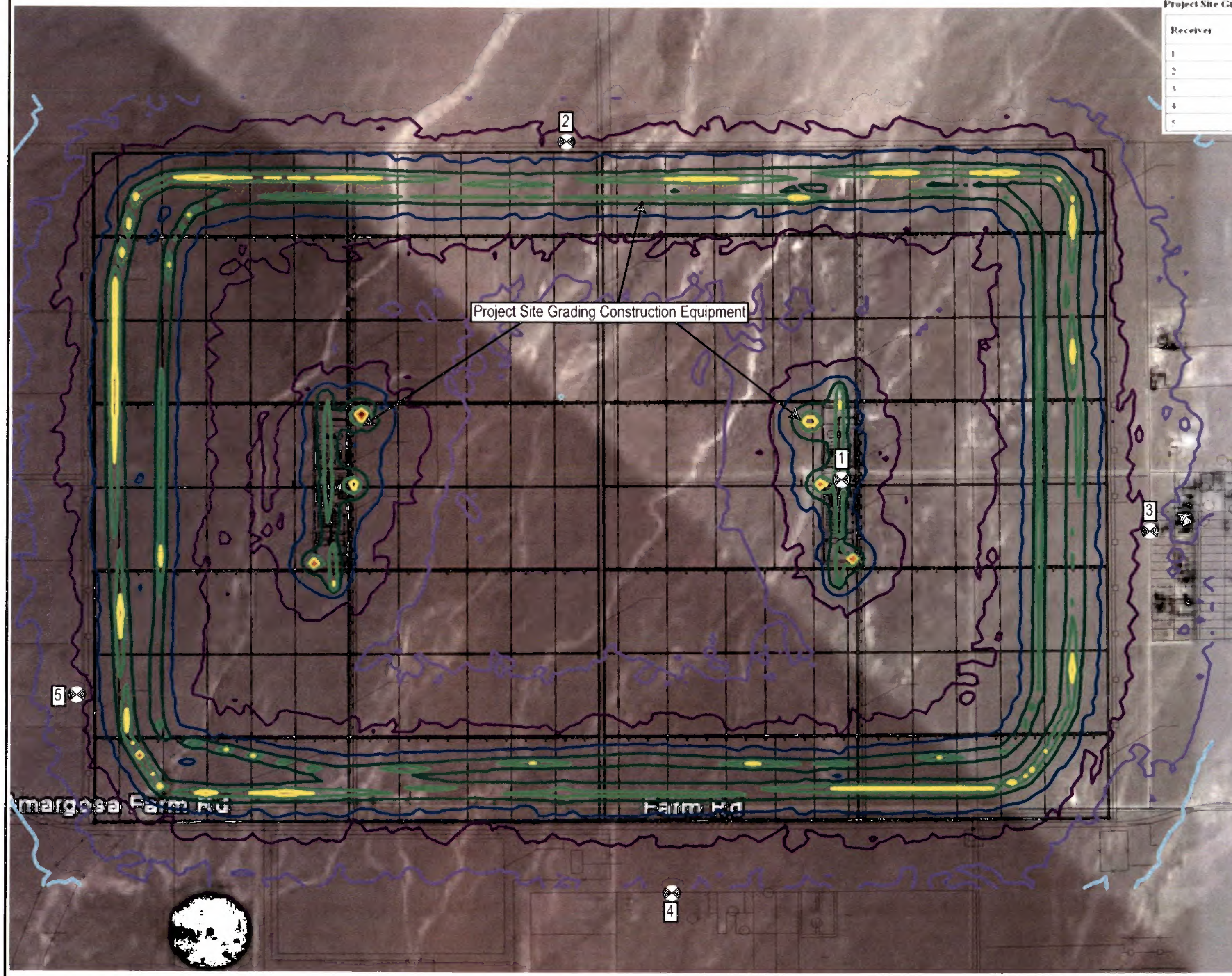
The proposed construction equipment to be used in the Project site grading phase is summarized in Table 4-16.

Table 4-16 Project Site Grading Phase Construction Equipment and Sound Pressure Levels			
Equipment	**Quantity**	**Operation Usage Percentage for 8 Hours**	**Sound Pressure Level at 50 feet (dBA)**
Generator	2	66%	82.0
Back Hoe	2	66%	80.0
Loader	2	66%	80.0
Dump Truck	2	66%	84.0
Excavator	1	66%	85.0
Water Truck	1	66%	84.0
Bull Dozer	2	66%	85.0

The noise impacts from the Project site grading construction activities were evaluated at five worst-case sensitive receiver locations, placed within and along the Project property lines. The worst-case noise impact calculations from the Project site grading construction activities to the sensitive receivers are summarized in Table 4-17.

Table 4-17 Project Site Grading Phase Temporary Construction Noise Impacts		
Receiver	**Location**	**Construction Noise Impacts (dBA Ldn)**
1	Eastern Power Block	70.8
2	Northern Property Line	57.1
3	Eastern Property Line	53.2
4	Southern Property Line	49.9
5	Western Property Line	53.1

EPA provides a guideline for outdoor noise impacts to residential property lines of 55 dBA Ldn. The calculations show that the worst-case construction noise levels at the property lines range from 49.9 dBA Ldn at the southern property line to 57.1 dBA Ldn at the northern property line. There are no sensitive noise receptors located along the northern property line; therefore, these noise impacts are considered to be minor and no mitigation will be required for the Project site temporary grading operations. A graphical representation of the noise impacts from the Project site temporary grading activities phase are presented on Figure 4-1.



Project Site Grading Phase Temporary Construction Noise Impacts

Receiver	Location	Construction Noise Impacts (dBA Ldn)
1	Eastern Powerblock	70.8
2	Northern Property Line	57.1
3	Eastern Property Line	53.2
4	Southern Property Line	49.6
5	Western Property Line	53.1

40 dBA Ldn
45 dBA Ldn
50 dBA Ldn
55 dBA Ldn
60 dBA Ldn
65 dBA Ldn
70 dBA Ldn
75 dBA Ldn
80 dBA Ldn
85 dBA Ldn
90 dBA Ldn

Amargosa Farm Road Solar Energy Project
Amargosa Valley, Nevada

Aerial Image Showing Noise Impact Contours from Project Site Grading Phase Construction Operations

ARCADIS

FIGURE 4-1

Phase 2 - Roadway Access Paving and Project Structural Foundation

The proposed construction equipment to be used for the Project related roadway access paving and structural foundation phase is summarized in Table 4-18.

Table 4-18 Roadway Access Paving and Project Structural Foundation Phase Construction Equipment and Sound Pressure Levels

Equipment	Quantity	Operation Usage Percentage for 8 Hours	Sound Pressure Level at 50 feet (dBA)
Generator	2	66%	82.0
Compactor	2	66%	80.0
Concrete Truck	2	66%	85.0
Concrete Pump	2	66%	82.0
Asphalt Paver	2	66%	85.0
Roller	2	66%	85.0
Vibratory Roller	2	66%	85.0
Grader	2	66%	85.0

The noise impacts from the roadway access paving and Project structural foundation construction activities were evaluated at five worst-case sensitive receiver locations placed within and along the Project property lines. The worst-case noise impact calculations from the roadway access paving and Project structural foundation construction activities to the sensitive receivers are summarized in Table 4-19.

Table 4-19 Roadway Access Paving and Project Structural Foundation Phase Temporary Construction Noise Impacts

Receiver	Location	Construction Noise Impacts (dBA Ldn)
1	Eastern Power Block	65.5
2	Northern Property Line	54.3
3	Eastern Property Line	40.2
4	Southern Property Line	55.0
5	Western Property Line	48.3

The EPA provides a guideline for outdoor noise impacts to residential property lines of 55 dBA Ldn. The calculations show that the worst-case construction noise levels at the property lines range from 40.2 dBA Ldn at the eastern property line to 55.0 dBA Ldn at the southern property line. These noise impacts are considered to be minor and no mitigation will be required for the roadway access paving and Project structural foundation temporary construction operations. A

graphical representation of the noise impacts from the Project site grading phase construction activities are presented in Figure 4-2.

Phase 3 - Project Mechanical Equipment Installation

The proposed construction equipment to be used in the Project mechanical equipment phase is summarized in Table 4-20.

Table 4-20 Project Mechanical Equipment Installation Phase Construction Equipment and Sound Pressure Levels

Equipment	Quantity	Operation Usage Percentage for 8 Hours	Sound Pressure Level at 50 feet (dBA)
Generator	2	66%	82.0
Crane	4	66%	85.0
Forklift	4	66%	85.0

The noise impacts from the Project mechanical equipment installation construction activities were evaluated at five worst-case sensitive receiver locations placed within and along the Project property lines. The worst-case noise impact calculations from the Project mechanical equipment installation construction activities to the sensitive receivers are summarized in Table 4-21.

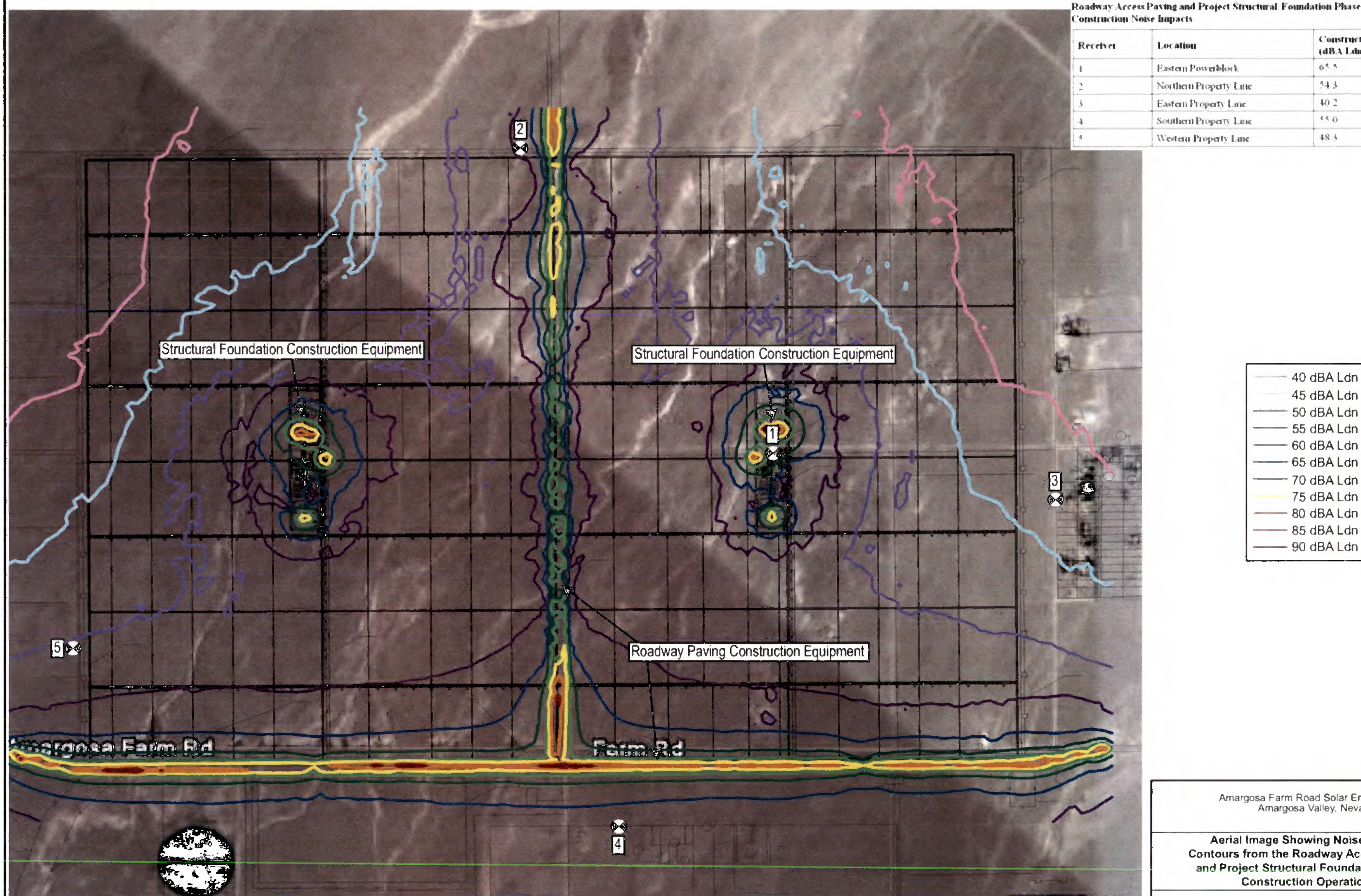
Table 4-21 Project Mechanical equipment Installation Phase Temporary Construction Noise Impacts

Receiver	Location	Construction Noise Impacts (dBA Ldn)
1	Eastern Power Block	65.8
2	Northern Property Line	35.3
3	Eastern Property Line	38.7
4	Southern Property Line	31.7
5	Western Property Line	38.0

The EPA provides a guideline for outdoor noise impacts to residential property lines of 55 dBA Ldn. The calculations show that the worst-case construction noise levels at the property lines range from 31.7 dBA Ldn at the southern property line to 38.7 dBA Ldn at the eastern property line. These noise impacts are considered to be minor and no mitigation will be required for the Project mechanical equipment installation temporary construction operations. A graphical representation of the noise impacts from the Project site grading phase construction activities are presented in Figure 4-3.

Roadway Access Paving and Project Structural Foundation Phase Temporary Construction Noise Impacts

Receiver	Location	Construction Noise Impacts (dBA Ldn)
1	Eastern Powerblock	65.5
2	Northern Property Line	54.3
3	Eastern Property Line	40.2
4	Southern Property Line	55.0
5	Western Property Line	48.3



Amargosa Farm Road Solar Energy Project
Amargosa Valley, Nevada

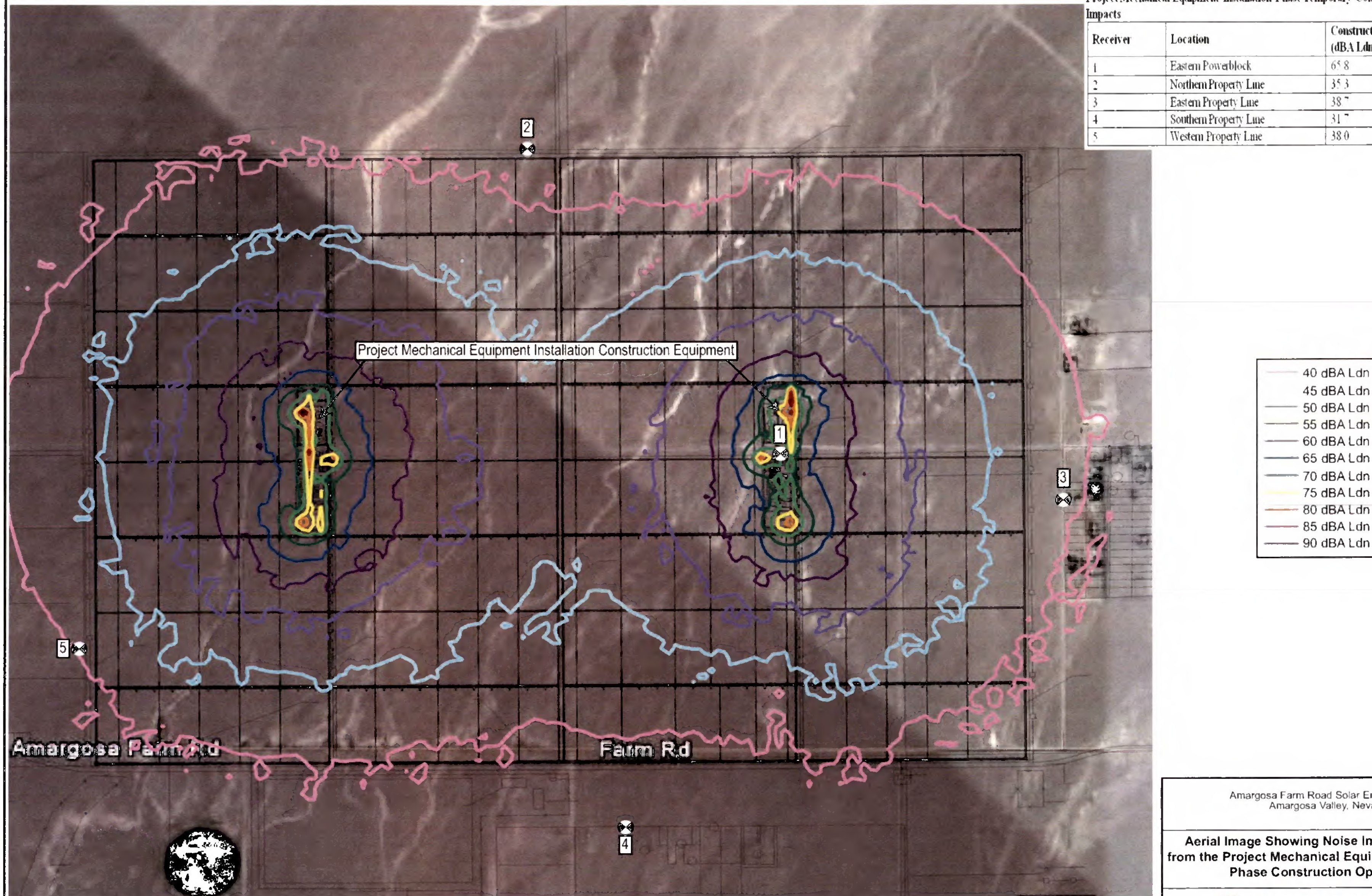
Aerial Image Showing Noise Impact Contours from the Roadway Access Paving and Project Structural Foundation Phase Construction Operations

ARCADIS

FIGURE
4-2

Project Mechanical Equipment Installation Phase Temporary Construction Noise Impacts

Receiver	Location	Construction Noise Impacts (dBA Ldn)
1	Eastern Powerblock	65.8
2	Northern Property Line	35.3
3	Eastern Property Line	38.7
4	Southern Property Line	31.7
5	Western Property Line	38.0



Amargosa Farm Road Solar Energy Project
Amargosa Valley, Nevada

Aerial Image Showing Noise Impact Contours from the Project Mechanical Equipment Installation Phase Construction Operations

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FIGURE
4-3

4.5.1.2 Operational Noise Impacts

The operational activities of the proposed Project were evaluated to determine the worst-case daily operational noise impacts to the defined sensitive receptors. This evaluation will determine if the daily operational noise impacts will exceed the EPA guidelines.

The proposed Project would operate continuously for 24 hours a day, 7 days a week; however, power generation noise would occur primarily during daytime hours, when the sun's energy is utilized in the power-generating process. The primary noise sources of a typical solar thermal power plant is centered around the power block area, where the steam turbine generator, air-cooled condenser, and other noise generating pump equipment are located.

Operation of the Project would generate an increase in vehicular traffic on local roads and area highways in the vicinity of the Project site. According to the Palen Noise Impact Report, dated August 2009, it is shown that an estimated 536 average daily traffic trip volume would be generated by the employees needed for the service and operation of the proposed Project. Employee and service vehicle access to the Project site would use US 95, then diverted to use the proposed T&T remote access roadway. Table 4-22 summarizes the proposed equipment and associated noise emission levels.

Table 4-22 Summary of Equipment Noise Levels

Quantity	Equipment Description	Manufacturer	Daytime Occurrences	Nighttime Occurrences	Sound Level Distance (meter)	Noise Level (dBA)
4	Demineralized Water Pump	N/A	100%	25%	1	92.0
4	Fire Protection Pump	N/A	100%	25%	1	92.0
8	Service Water Pump	N/A	100%	25%	1	92.0
6	Condensate Pump	N/A	100%	25%	1	92.0
4	Cooling Tower	N/A	100%	25%	1	85.0
4	Auxiliary Cooling Water Pump	N/A	100%	25%	1	92.0
4	Closed Cooling Water Pump	N/A	100%	25%	1	92.0
2	Emergency Diesel Generator	N/A	100%	25%	1	85.0
2	Generator	N/A	100%	25%	1	85.0
2	Generator Setup Transformer	N/A	100%	25%	1	108.0
2	Feedwater Pump	N/A	100%	25%	1	92.0

Table 4-22 Summary of Equipment Noise Levels						
Quantity	**Equipment Description**	**Manufacturer**	**Daytime Occurrences**	**Nighttime Occurrences**	**Sound Level Distance (meter)**	**Noise Level (dBA)**
4	Freezer Protection Pump	N/A	100%	25%	1	92.0
20	HTF Pump	N/A	100%	25%	1	92.3
6	Overflow Return Pump	N/A	100%	25%	1	92.0
2	Air Cooled Condenser	N/A	100%	25%	1	122.0
2	Auxiliary Boiler	N/A	100%	25%	1	102.0
8	Steam Generator	N/A	100%	25%	1	85.0
2	Steam Turbine	N/A	100%	25%	1	85.0

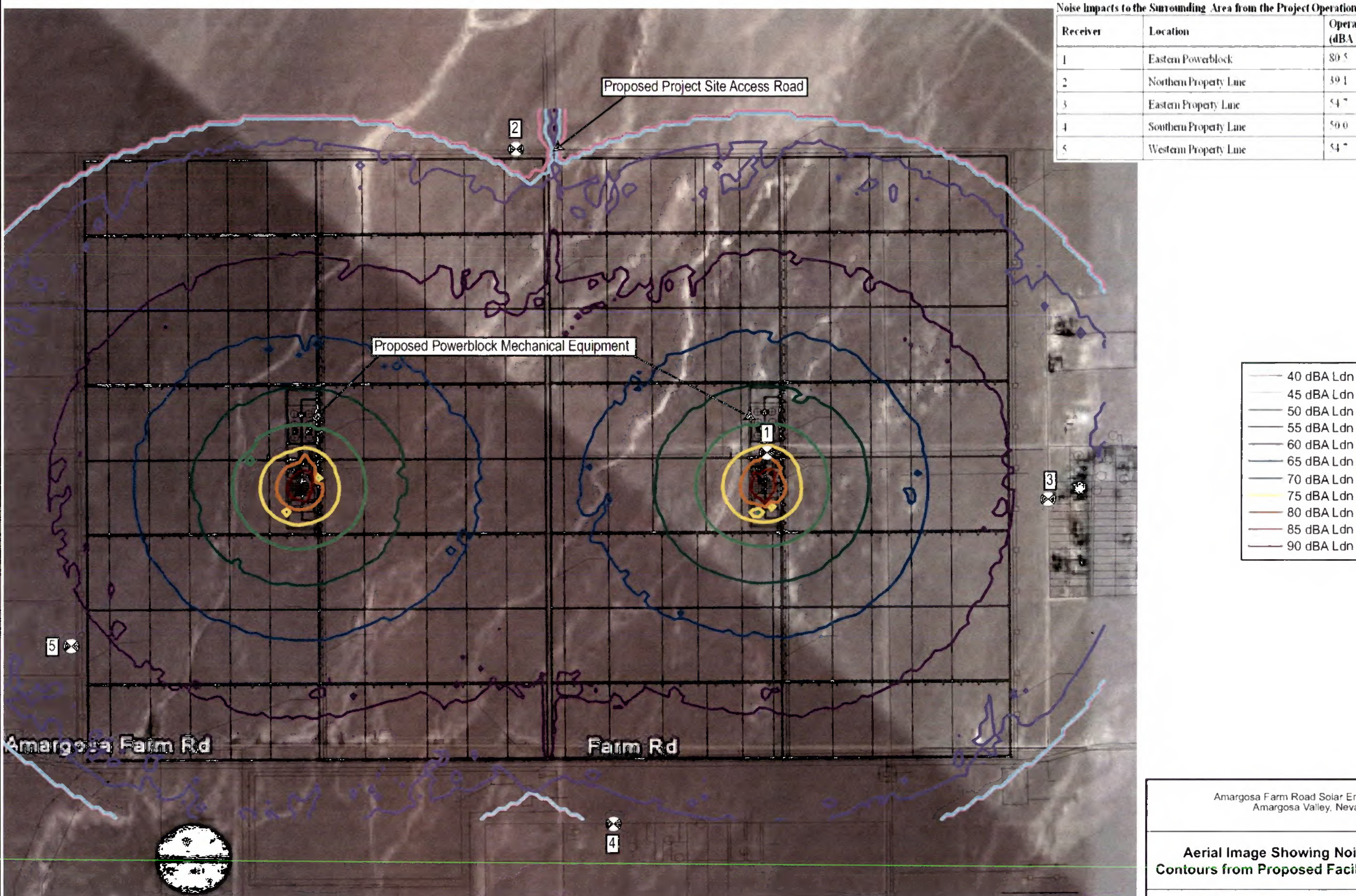
The combined mechanical equipment noise impacts from the proposed solar energy Project were evaluated at five strategically placed worst-case receivers located within and along the Project property lines. Table 4-23 shows the calculated operational mechanical noise impacts at these five worst-case receiver locations.

Table 4-23 Noise Impacts to the Surrounding Area from the Project Operations		
Receiver	**Location**	**Operational Noise Impacts (dBA Ldn)**
1	Eastern Power Block	80.5
2	Northern Property Line	39.1
3	Eastern Property Line	54.7
4	Southern Property Line	50.0
5	Western Property Line	54.7

Calculations show that the noise impacts from the solar facility's daily operations would range from 39.1 dBA Ldn at the northern property line to 54.7 dBA Ldn at the eastern property line. The noise impacts associated with the Project's operational activities are shown to be minor and no mitigation will be required. A graphical representation of the noise impacts from the Project's combined daily operations are presented on Figure 4-4.

Noise Impacts to the Surrounding Area from the Project Operations

Receiver	Location	Operational Noise Impacts (dBA Ldn)
1	Eastern Powerblock	80.5
2	Northern Property Line	39.1
3	Eastern Property Line	54.7
4	Southern Property Line	50.0
5	Western Property Line	54.7



Amargosa Farm Road Solar Energy Project
Amargosa Valley, Nevada

Aerial Image Showing Noise Impact Contours from Proposed Facility Operations

ARCADIS

FIGURE
4-4

The Project-generated traffic will be routed to bypass the residential community by using US 95, then diverting to the proposed T&T remote access roadway, Valley View Boulevard or NV 373 to Anvil Road to Powerline Road. These routes will ensure the preservation of the community ambient noise environment in the area. The cumulative traffic noise impacts from the increased projected-related traffic to the local roads and highways will result in an increase to the existing ambient noise level by less than 3 dB; therefore, the increase is considered minor.

The employees and contractors proposed for servicing the equipment within the Project's operational mechanical areas may be considered as a sensitive noise receptor location. The federal OSHA Standards regulate an individual worker's noise exposure level based on a continuous 8-hour work day. The exposure level is based on the noise source and the duration that the worker is exposed to the noise. The combined mechanical equipment noise impacts from the proposed Project within these Project operational power block areas were evaluated at a single receptor location within the eastern power block. Table 4-24 shows the calculated mechanical noise exposure levels to the eastern power block based on a continuous 8-hour workday.

Table 4-24 Noise Impacts to the Project Area from the Project Operations Based on a Continuous 8-Hour Workday

Receiver	Location	Operational Noise Impacts (dBA)
1	Eastern Power Block	79.2

Based on the overall worst-case noise emission levels of the proposed mechanical equipment and the hours of the facility's operation, calculations show that workers located within the operational power block areas will be exposed to noise impacts of 79.2 dBA. The result of this worst-case calculated noise level demonstrates that a typical 8-hour work schedule will not expose a worker or contractor to an 8-hour TWA noise exceedance exposure limit of 90 dBA, as described by the OSHA regulations; therefore, noise exposure is considered less than significant.

4.5.2 Wet-Cooled Alternative

Noise impacts from construction and operation of a wet-cooled solar plant may be similar to the impacts described for the Proposed Action— D ry-Cooled Alternative. Further evaluation shows that the wet-cooled operation is shown to require an increase in the number of pumps and specialty type equipment, such as a cooling tower. According to a study conducted for the Beacon Solar Energy Project, a proposed wet-cooled solar plant in California, the noise emission levels presented for this wet-cooled solar plant are similar to the noise emission levels for a dry-cooled solar plant (ENSR/AECOM 2008). The main difference between the two systems is the layout and height of the noise-producing mechanical equipment. Preliminary analysis for the wet-cooled solar plant alternative indicates the noise levels would be less than the Proposed Action – Dry-Cooled Alternative.

4.5.3 No Action Alternative

Under the No Action Alternative, there would be no noise impacts from temporary construction and permanent operation of the proposed Project.

4.5.4 Mitigation

The proposed Project does not require any form of noise mitigation. Due to the isolated location of the Project site, calculations show that the operational noise levels will be below all significant noise threshold limits at defined sensitive residential receptors. Also, the temporary construction activities necessary to develop the proposed Project are shown to be below the EPA noise thresholds guidelines for all three evaluated temporary construction phases. Lastly, the results of noise impacts generated during normal work hours show that the workers will not be exposed to the OSHA 8-hour TWA noise threshold limit of 90 dBA; therefore, the Project is not required to conduct a hearing conservation plan as a result of this study.

4.6 Biological Resources

4.6.1 Vegetation

4.6.1.1 Proposed Action

Permanent impacts involve areas that are paved or otherwise precluded from restoration to a pre-Project state. Mojave desert scrub generally has a slow recovery rate, but recovery potential also depends on the nature and severity of the impact. There are permanent impacts to vegetation when there is no evidence to indicate that pre-disturbance levels of biomass, cover, density, soils, and plant community structure could be achieved within approximately 5 years. The Project would include clearing for the facilities and would occupy approximately 4,350 acres, including solar fields, power blocks, an office and maintenance building, parking area, laydown area, and a stormwater detention basin.

Removal of vegetation would involve mostly shrubs such as creosote bush, saltbush, and burrobush, and widely scattered forbs and grasses, primarily cryptantha, Mediterranean grass, goldfields, and devil's spineflower. Other forb species that would be removed include various annual buckwheat species (e.g., flat-topped buckwheat, Thomas' buckwheat) and several species of the primrose family (e.g., devil's lantern and Booth's evening primrose).

In areas where permanent clearing and grubbing would occur, there would be coordination between the Proponent and the BLM to determine the best approach to create a level, hard packed surface in order to control dust. In other areas construction activities could promote the proliferation of non-native invasive weeds, particularly Russian thistle, which was observed on the Project site. This species is currently not listed by the Nevada noxious weed list, but is considered aggressive and opportunistic, and often portrays weed-like trends. Other weed species that could invade the Project site over the long term include puncture vine (*Tribulus terrestris*),

perennial pepperweed (*Lepidium latifolium*), gumweed (*Grindelia* spp.), yellow star thistle (*Centaurea solstitialis*), and Russian knapweed (*Acroptilion repens*). Clearing of vegetation also could affect habitat structure and ecological function of riparian communities.

An indirect impact to vegetation on solar facility projects would normally include shading from parabolic troughs that would reduce the amount of sunlight available for photosynthesis; however, it is the Proponent's intent to permanently eliminate vegetation in the solar fields. Other indirect impacts include soil compaction, spread of weeds already present in the construction footprint to areas not currently infested, accidental introduction of new weed species from contaminated equipment, and changes in the distribution of precipitation falling on the solar fields. During rain events, water would be concentrated along a drip line, which could change the soil water content and cause some erosion of the soil.

Impacts to Special Status Species or Species Protected by the State of Nevada

The construction of the Project would directly impact two cactus species, including golden cholla (also called silver cholla) and beavertail pricklypear. Under NRS 527.060-120, it is illegal for any company or individual to cut, destroy, mutilate, remove, or possess cactus and yucca, or portions of these plants. The golden cholla and beavertail pricklypear occurrences are located in three main areas of the Project area. All cacti that are planned for removal must be approved and tagged by the BLM and translocation coordinated. No other special status plant speeies occur within the Project area.

Impacts to Federally Endangered, Threatened, Proposed, and Candidate Plant Species

No federally listed plant species were found in the Project area, but seven species were identified by the USFWS as occurring within the ROI, which includes the Ash Meadows NWR, located approximately 7 miles southeast of the Project area. (See Section 3.6 for the list of species.)

A Biological Assessment (BA) is currently being prepared for the seven species that occur in the Project's ROI that could be affected by implementation of the Project. It is anticipated that there will be no direct effects to the species; however, long-term groundwater pumping of the Project could indirectly impact six of the seven plant species at Ash Meadows. The extent of this potential impact is unclear. The water level in Devils Hole is declining due to current ground water pumping. By 2020, the water level is expected to reach a court mandated minimum water level needed to sustain the Devils Hole pupfish if 2003 pumping levels continue (Hughson 2009). The results of the groundwater modeling simulations showed after 200 years, 400 afy of pumping would cause simulated water levels at Devils Hole to decline an additional 0.05 feet. However, it is impossible to specifically measure Project effects on drawdown at Devils Hole, because of limitations of the model design. During coordination with BLM and USFWS, it was agreed that the model is the best available tool for analyzing potential impacts to groundwater but is not accurate enough to fully assess potential impacts.

The USFWS identified the white bearpoppy (*Arctomecon mernamii*), a species at risk by the NNHP, as warranting impact analysis. During extensive plant surveys conducted within the Project area in 2009, the bearpoppy was not found, although low quality habitat is present. Based

on its absence, there are no known impacts to the species as a result of the Project, and no avoidance and mitigation measures developed for the plant.

4.6.1.2 Wet-Cooled Alternative

Under the wet-cooled alternative, impacts to vegetation would be similar to those under the Proposed Aetion. However, the amount of ground disturbance would be greater as one 23 acre, nominal surface area, evaporation pond would be required for each 242 MW power block in addition to the ground disturbance required under the Proposed Action. These evaporation ponds would result in an additional 46 acres of total permanent disturbance to native vegetation and additional loss of habitat.

Impacts from groundwater pumping to sensitive plant species occurring at Ash Meadows NWR, would be similar to current conditions, as no increased pumping would occur. With either a wet- or- dry-cooled option, water rights would be acquired from existing water right owner(s). It could be assumed that the water that would be acquired for the wet-cooled option may still be used on an annual basis by the current water rights owner(s) in the current capacity. Therefore, impacts to nearby sensitive plant species would have minimal change if the current 10-year average remains consistent throughout the life of the Project.. The minimal change will be due to the conversion of agricultural use to industrial uses because of the reduction of return flow from irrigation.

4.6.1.3 No Action Alternative

The No Action Alternative is a Proposed Action that would not be undertaken. Under this alternative, BLM land on which the Project is proposed would continue to be managed within the BLM framework as a program of multiple use and sustained yield. The impacts of the proposed Project to vegetation would not occur; therefore, it would not cause any significant impacts to vegetation, including special status species or plants protected by the State of Nevada. However, the land would be available to other renewable projects in the Amargosa Valley. There are currently 11 applications for solar and wind energy projects, all located from near the Town of Beatty, southeast to the western edge of Spring Mountain Natural Resource Area, in southern Nye County, Nevada.

4.6.1.4 Mitigation

Due to the limitations of the DVRFS model, impacts to Ash Meadows NWR and its associated threatened and endangered species of plants and animals arising from the conversion of 400 afy of groundwater in the Amargosa Desert Hydrographic Basin from agricultural to industrial use are unclear. For this reason, mitigation measures to address uncertain impacts have not yet been identified and agreed to by the Proponent and the BLM. Consultation between the BLM, USFWS, NPS, and Proponent for acceptable mitigation measures is ongoing. Mitigation measures will be developed prior to the issuance of the Final EIS and contained in the Project Record of Decision.

A comprehensive Noxious Weed Management Plan (Plan) will be prepared with the goal of keeping the Project area free from noxious weeds (Mitigation Measure Veg5). Adherence to the specific weed control mitigation measures in this Plan will minimize the introduction and spread of noxious and invasive weeds during and following construction of the Project. Early detection and rapid response are important considerations in the development of the Plan which includes: (1) Identification of problem areas, (2) preventative measures that will be implemented to prevent the spread of these and other noxious weeds during construction, (3) treatment methods during construction and post-construction, and (4) reclamation and post-construciton monitoring. This Plan will also help minimize impacts to native plant communities temporarily impacted by the Project. Refer to Appendix A for a compilation of mitigation measures which will be used to minimize or eliminate impacts to native vegetation resulting from construction and operation of the Project (Mitigation Measures Veg1-4 and Veg6-8). It is anticipated that following the implementation these measures, impacts would be reduced to vegetation by keeping construction vehicles and other activities restricted to pre-designated areas, instructing construction personnel on the protection of native vegetation, limiting project construction to pre-determined areas based on the temporary and permanent disturbance areas, and flagging, salvaging, and replanting those species identified by BLM as sensitive. Proper mitigation measures would be required during two phases of the application process, including construction and operation and maintenance of the Project.

4.6.2 Wildlife

4.6.2.1 Proposed Action

Clearing and grubbing vegetation would directly impact wildlife resulting in loss of and fragmentation of cover, breeding, traveling, and foraging habitat. Clearance surveys prior to construction would ensure that construction activities would not cause mortality to individuals. Mortality could occur from collisions with equipment and vehicles. In addition, predation could increase as construction displaces wildlife from protected cover to uncovered habitat. Common predators attracted to areas of increased activity and noise include coyotes, foxes, raptors, ravens, and domestic dogs. The less mobile species (e.g. reptiles, small mammals, ground-nesting birds) would be particularly susceptible from grading and construction activities, and eould cause mortality to those animals. (See discussion on *mammals, migratory birds, reptiles and amphibians* below).

During the scoping phase of the Project, other general wildlife issues were identified including: (1) impacts from shading of desert habitat caused by solar fields; (2) effects of fencing on wildlife; (3) impacts to local ecosystems; (4) impacts to birds resulting from heat generated by mirrors; (5) impacts resulting from use of security lighting; and (6) increased noise during construction and operation of the Project. These issues are briefly discussed below.

Permanent clearing and grubbing would be performed for the solar fields; as such, no native vegetation would remain. Although 4,350 acres of wildlife habitat loss is a significant impact, there would be no impacts from shading of desert habitat. Fencing typically ereates a barrier for wildlife movement through an area, but if vegetation is completely removed for construction of

the solar field, it is highly unlikely wildlife would use the site as a travel corridor. According to NDOW, big game such as mule deer and bighorn sheep do not utilize the area (see section on *Big Game* below), although other wildlife may use Fortymile Wash as a movement corridor. Lighting may contribute to the collision risk of birds and bats, especially nocturnal species, and other wildlife that occur adjacent to the Project site such as nesting birds, foraging mammals, and flying insects. Noise can disrupt normal activity and behavior of wildlife, especially nesting and foraging birds. (See discussion on *migratory birds* below.)

Based on findings of biological surveys conducted for this Project, the following section discusses specific impacts to various taxonomic groups of animals.

Mammals

Big Game – Desert (Nelson) Bighorn Sheep (*Ovis Canadensis nelsoni*) and Mule Deer (*Odocoileus hemionus*) occupy the mountainous areas surrounding the Project area, but according to NDOW (per 2009 coordination meeting) there is no evidence to suggest there is population connectivity or regularly traveled movement corridors east to west across the Amargosa Valley; as such, impacts to big game species are not anticipated for this Project.

Other Mammals – During biological surveys conducted in 2009 in support of this Project, a total of 18 mammal species were observed in the Project area. Construction and operation of the Project may cause direct mortality to burrowing mammals identified in Section 3.6. Those animals displaced during construction could be crushed by equipment and vehicles or be killed by increased predators in the area. The bats forage on insects, so removal of vegetation and rechanneling of washes during construction could disrupt natural foraging habitats for bats in the Project area. After completion of the Project, bats may find Project components attractive for roosting or foraging.

Migratory Birds

Habitat in the Project area provides cover, breeding, foraging, and traveling habitat for a number of bird species. During biological surveys conducted in 2009, 27 species were observed in the Project area.

The Project area contains suitable habitat for Burrowing Owl and the LeConte's Thrasher, and both species are known to occur in the area. LeConte's Thrashers build their nests in shrubs 2 to 4 feet off the ground, so shrub removal would eliminate nesting, cover, and foraging potential for the bird within the Project footprint. Suitable nesting and foraging habitat are absent for the Phainopepla; therefore, no impacts are anticipated for this species, even though it was observed in the Project area in the Spring 2009.

The Project area does not contain suitable nesting or roosting habitat for raptors, and only marginal foraging habitat for these species. Suitable nest sites for Swainson's Hawk may occur in adjacent agricultural areas; however, no nesting habitat exists in the vicinity for Prairie Falcon.

The NDOW and USFWS identified other species with heightened conservation priority that could be impacted by construction and operation of the Project. They include Bendire's Thrasher and Loggerhead Shrike. Neither of these species were detected during 2009 surveys.

Bendire's Thrasher is included as a Watch List species by Partners in Flight, which calls for the species conservation due to restricted continental range and small population size. It is highly unlikely that Bendire's Thrasher would occupy habitat within the Project area; therefore, no impacts to this species are anticipated. The Loggerhead Shrike is included as a Priority Species by Partners in Flight due to declines from habitat loss, pesticides, and winter mortality. Habitat in the Project area contains unsuitable nest tree structure, and does not provide adequate perch areas for the bird. It is highly unlikely the Loggerhead Shrike would nest within the Project area; however, if suitable nesting trees or shrubs are present nearby, the Project could provide foraging habitat, and foraging potential could increase after completion of the Project due to the presence of taller structures that could serve as perches or lookouts.

For those bird species that have the potential of nesting in the Project area, the loss of active bird nests or young is regulated by the federal MBTA, so it is unlawful to pursue, hunt, take, capture, kill, or possess any migratory bird or part, nest, or egg of such bird listed in 50 CFR 10.13. The MBTA applies to the bird species that will be impacted during the construction phase of the Project. Compliance with the MBTA will require surveying for and delineating non-disturbance buffers for nesting birds during the breeding season.

Noise from construction activities could temporarily disturb wildlife from foraging and nesting immediately adjacent to the Project area. Birds rely on vocalizations during the breeding season to attract a mate within their territory and to respond to potential dangers in the area and young begging for food. Noise levels from certain construction and operation activities could reduce the reproductive success of nesting birds.

Reptiles

Grading and construction activities and vehicle use could cause direet mortality to slower-moving reptiles. These cold-blooded animals use their environment to thermoregulate, and because they cannot shelter themselves from heat and cold during construction activities, they would likely die from exposure, predation, or crushing from vehicles and equipment.

Snakes and Lizards – During biological surveys conducted in 2009 in support of this Project, a total of six snake species and six lizard species were found in the Project area (see Section 3.6 for identified list of species). Of the 12 total species of snakes and lizards present in the Project area, the Desert Iguana is on the NNHP Plant and Animal Watch List, which means the iguana is vulnerable to decline by habitat loss. Construction of the Project would eliminate iguana habitat that includes creosote bush on sandy soils. The second reptile that has been identified as a conservation priority species is the Nevada Shovel-nosed Snake. The reach of Fortymile Wash located inside the Project limits will be bladed and rechanneled around the periphery of the solar facility; therefore, Nevada Shovel-nosed Snake habitat will be eliminated during construction of the Project.

Amphibians

The southern limit of the Amargosa Toad's range is located in Oasis Valley near Beatty, approximately 25 miles north of the Project area. Due to the lack of permanent water this species is not expected to occur within the Project area. Furthermore, groundwater pumping for the Project is not expected to impaet hydrological function of the watershed, and therefore toad habitat in Oasis Valley.

Impacts to Federally Endangered, Threatened, Proposed, and Candidate Wildlife Species

Desert Tortoise

The Project is located in the Desert Tortoise Eastern Mojave Recovery Unit and close to the border of the Northwestern Mojave Recovery Unit, but is not designated as Critical Habitat. Construction of the Project would eliminate approximately 4,350 acres of low quality Desert Tortoise habitat. During surveys conducted in 2009 in support of this Project, no live or dead tortoises were found, but four old Class 4 burrows were located in the northwest portion of the Project area.

In the event that a tortoise is found in the Project area, impacts would include loss of foraging, nesting, and cover sites; loss of dispersal areas and conneetivity to other areas; and contracted home ranges. Juvenile Desert Tortoise may face an increased risk of predation from raptors and ravens attracted to the site and increased availability of perches. Tortoises may also face impacts due to increased risk from roads and traffic. The site will be surrounded by tortoise-proof fencing to prevent any Desert Tortoise from becoming entrapped by the flood control channels or impacted by work occurring within the facility.

With exception of the Desert Tortoise, no other federally listed wildlife species or habitat are present within the Project area.

Ash Meadows NWR Species

Five fish (Devils Hole Pupfish, Ash Meadows Amargosa Pupfish, Warm Springs Pupfish, and Ash Meadows Speckled Dace) and one invertebrate (Ash Meadows naucorid) inhabit the Ash Meadows NWR within the Project's ROI. A Biological Assessment (BA) is currently being prepared for these six wildlife species that could be affected by implementation of the Project. It is anticipated that there will be no direct effects to the species; however, long-term groundwater pumping of the Project could indirectly impact these six wildlife species at Ash Meadows. The extent of this potential impact is unclear. The water level in Devils Hole is declining due to current ground water pumping. By 2020, the water level is expected to reach a court mandated minimum water level needed to sustain the Devils Hole pupfish if 2003 pumping levels continue (Hughson 2009). The results of the groundwater modeling simulations showed after 200 years, 400 afy of pumping would cause simulated water levels at Devils Hole to decline an additional 0.05 feet. However, it is impossible to specifically measure Project effects on drawdown at Devils Hole, because of limitations of the model design. During coordination with BLM and USFWS, it was agreed that the model is the best available tool for analyzing potential impacts to

groundwater but is not accurate enough to fully assess potential impacts. For this reason, mitigation measures to address uncertain impacts have not yet been identified and agreed to by the Proponent and the BLM. Consultation between the BLM, USFWS, NPS, and Proponent for acceptable mitigation measures is ongoing. Mitigation measures will be developed prior to the issuance of the Final EIS and contained in the Project Record of Decision.

4.6.2.2 Wet-Cooled Alternative

Under the wet-cooled alternative, impacts to wildlife would be similar to those under the Proposed Action. However, the amount of ground disturbance would be greater as one 23-acre evaporation ponds per 242 MW power block would be required for the wet-cooled alternative.

The wet-cooled alternative would include two evaporation ponds that would collect blowdown water from the cooling towers. There is potential for wildlife threats posed by the evaporation ponds. First, creation of a new water source to an area where water is scarce could attract ravens to the Project, potentially increasing predation rates on juvenile desert tortoise in adjacent habitat. Second, waterfowl, shorebirds, and other resident or migratory birds could be harmed by high selenium levels or hyper-saline conditions if they drink evaporation pond water or eat aquatic invertebrates (or their terrestrial emergents) inhabiting evaporation pond water. The evaporation and associated risk to birds are a source of concern

For wet- or dry-cooled alternatives, the Proponent would either lease or purchase existing certified water rights for water needs during construction and operation of the proposed Project. With either a wet- or dry-cooled option, water rights would be acquired from existing water right owner(s). Groundwater flow model simulations and a hydrologic analysis have been performed for the dry-cooling option. It could be assumed that the water that would be acquired for the wet-cooled option may still be used on an annual basis by the current water rights owner(s) in the current capacity. Therefore, impacts to nearby wildlife resources would have minimal change if the current 10-year average remains consistent throughout the Project life. The minimal change will be due to the conversion of agricultural water rights to industrial water rights, because of the reduction of return flow from irrigation.

4.6.2.3 No Action Alternative

Under the No Action Alternative, the impacts of the proposed Project to wildlife would not occur; therefore, would not cause any significant impacts to wildlife, including federally listed and other special status species.

4.6.2.4 Mitigation

The creosote bush series of Mojave desert scrub provides foraging, cover, and breeding habitat for migratory birds. The proposed solar plant would eliminate nesting habitat and result in direct and cumulative impacts to these species due to habitat loss or injury/mortality of individuals. To avoid and minimize impacts to migratory birds, mitigation measures WL1 through WL2 have been proposed; mitigation measures WL3 and WL4 address the Burrowing Owl specifically. To

discourage raptors from perching on the 230kV transmission line, mitigation measure WL5 is proposed.

The construction and operation of the proposed Project would result in the loss of approximately 4,350 acres of low quality tortoise habitat. According to the BLM's "*Desert Tortoise Habitat Management on the Public Lands: A Rangewide Plan,*" compensatory mitigation is required to offset the impact and fully mitigate for Desert Tortoise. Additionally, the construction and operation of the Project may result in an impact to the species located at Ash Meadows NWR. Mitigation measures WL6 through WL22 will be implemented to minimize and avoid impacts to Desert Tortoise. Following USFWS review of the BA, the level of compensatory mitigation required for this Project will be determined. All terms and conditions detailed in the Biological Opinion will be adhered to. It is anticipated that by following the guidance in the Biological Opinion as well as the mitigation detailed below, impacts to biological resources will be minimized.

Gila Monsters were not found during the biological surveys conducted in 2009, but the species is difficult to detect and cannot be assumed to be absent based on the surveys. If they are present in the Project area, they could be harmed or killed during construction activities. To avoid or minimize potential impacts to the Gila Monster, conservation measures WL23 and WL24 are proposed.

Appropriate mitigation measures would be required during, construction, and operation and maintenance of the proposed Project. A list of mitigation and conservation measures is included in Appendix A.

4.7 Historic and Cultural Resources

The following presents possible environmental consequences to known cultural sites.

4.7.1 Proposed Action

Based upon the complete cultural inventory of the proposed Project's APE, thirteen prehistoric and/or historic cultural sites in the currently proposed Project area were newly recorded and evaluated to whether they were eligible for listing on the National Register of Historic Places. The BLM in consultation with the Nevada State Historic Preservation Office (SHPO) both concurred that only one prehistoric site (26Ny13440) is an eligible property that could yield important information regarding prehistory in southern Nevada. Due to the site's size and composition, it would be adversely impacted by proposed Project activities in both action alternatives.

Mitigation, in consultation with the SHPO as per 36 CFR 800.6, would need to be addressed under an approved Treatment Plan and would likely involve formal data recovery prior to Project related ground-disturbing activities. Tribal representatives are also in agreement with the BLM and SHPO on the eligibility status of the cultural sites and that data recovery needs to occur.

Given the low density of sites in this large Project area, the potential for unanticipated discoveries is low.

A field inspection of the viewshed surrounding the Project area was also performed and resulted in the determination that there would be no visual impacts to any historic properties in the town of Amargosa.

4.7.2 Wet-Cooled Alternative

Impacts to cultural and historic resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).

4.7.3 No Action Alternative

Under the No-Action alternative, the proposed Project would not be constructed, and no historic or cultural resources would be affeeted by any Project activities, however, the purpose and need for the Project would not be met.

4.7.4 Mitigation

No mitigation is required.

4.8 Paleontological Resources

This section describes and evaluates the potential impacts on paleontological resources that would result from the construction, operation, maintenance, and decommissioning of the proposed Project.

4.8.1 Impact Assessment Methodology

In order to assess the relative impact each alternative may potentially have on paleontological resources, potential impact levels were determined for each alternative based on the PFYC, the inventory database of fossil localities, and the paleontological resources survey. Literature research, institutional record searches, the paleontological resources survey, and the PFYC provided the information necessary to assign a potential impact level of high, low, or moderate/undetermined to portions of the Project area. Future provisions for mitigation of adverse impacts to significant paleontological resources exposed during construction-related activities in the Project area are based upon these determinations of potential impact level. The terms "high potential impact level," "low potential impact level," and "moderate/undetermined potential impact level" are defined as follows.

High Potential Impact Level. Geological units with a high potential for containing significant paleontological resources are determined to have a high potential impact level. In these cases, the

geological unit contains a high density of recorded fossil localities, has produced fossil remains in or near the vicinity of the proposed Project, and is very likely to yield additional remains during construction. Areas identified as having a class 4 or 5 in the PFYC system are considered to have a high potential impact level.

Low Potential Impact Level. The geological unit contains no or a very low density of recorded fossil localities, has produced little or no fossil remains in the vicinity of the proposed Project, and is not likely to yield any fossil remains. Nevertheless, geological units with few or no prior recorded fossil localities can still prove fossiliferous during paleontological mitigation activities. Areas identified as having a class 1 or 2 in the PFYC system are considered to have a low potential impact level.

Moderate/Undetermined Potential Impact Level. The geological unit has limited exposure in the Project area, is poorly studied, or contains no recorded paleontological resource localities. However, in other areas, the same or similar geological units may contain sufficient paleontological localities to suggest that exposures of the unit in the Project area would have at least a moderate potential for yielding fossil remains. Areas with a class 3 in the PFYC system are considered to have a moderate or undetermined potential impact level.

The analysis of impacts to paleontological resources is based on a literature review of known resources, record searches at paleontological institutions, the paleontological resources survey, and assignment of paleontological potential based on geological units and known fossil localities. The following indicators were considered when analyzing the potential impacts to paleontological resources:

- known fossil localities
- proximity to geological units with potential to contain paleontological resources
- depth of excavations associated with project components

The following section describes the potential impacts on paleontological resources for each Project alternative.

4.8.2 Proposed Action

The Proposed Action is anticipated to have a low impact on paleontological resources within the Project area. Low impact areas comprise young alluvial deposits (Qay) and intermediate alluvial deposits (Qai). These geological units are considered to contain a low potential for paleontological resources.

4.8.3 Wet-Cooled Alternative

Impacts to paleontological resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).

4.8.4 No Action Alternative

Under the No Action Alternative, there would be no Project-related impacts to paleontological resources.

4.8.5 Mitigation

The primary impact issue for paleontological resources is the loss of scientifically significant fossils and their contextual data. Two types of impacts could potentially affect paleontological resources:

- Direct and permanent ground disturbance during construction
- Indirect and permanent disturbance due to changes in public accessibility

The primary concern regarding impacts to paleontological resources is that direct damage or destruction of fossils would result in the loss of important scientific information. It is possible that ground disturbance, such as grading and cutting of access roads, could encounter important paleontological resources. In addition, adverse impacts indirectly associated with construction are a concern. For example, fossils could be subject to damage or destruction by erosion that is accelerated by construction disturbance. Improved access and increased visibility as a result of construction could cause fossils to be damaged, destroyed, or collected as a result of unauthorized collection or vandalism. However, not all impacts of construction are adverse to paleontology. Excavation can and often does reveal significant fossils that would otherwise remain buried and unavailable for scientific study. In this manner, excavation can result in beneficial impacts. Such fossils can be collected properly and catalogued into the collection of a museum repository so that they can be available for scientific study.

Results of the data inventory, paleontological resources survey, and impact assessment demonstrate that the geological units present in the Project area have a low potential to contain significant paleontological resources. As a result, specific mitigation measures are not necessary. However, should significant paleontological resources be discovered during construction, then mitigation measures should be implemented to reduce potential adverse impacts to significant paleontological resources resulting from Project construction. The mitigation measures described in Appendix A are in compliance with the SVP standard guidelines for mitigating adverse construction-related impacts on paleontological resources and should be followed if significant paleontological resources are discovered during construction (SVP 1995, 1996). Implementation of these mitigation measures will effectively reduce potential impacts to paleontological resources to a negligible level by allowing for the collection of fossils and corresponding geological and paleo-environmental data that otherwise might be lost to earth-moving activities. The scientific and educational value of the fossils and their associated contextual data constitute the chief significance of the resource. Their collection, therefore, mitigates the impacts to paleontological resources. These mitigation measures are subject to review by the BLM.

4.9 Socioeconomic Resources

The following sections discuss the potential effects of construction and operation on the socioeconomic resources within the ROI.

4.9.1 Proposed Action

Implementation of the Proposed Action would have a direct and indirect effect on regional social and economic resources from the increase in the level of economic activity in the area that would result from construction and operation of the proposed Project.

4.9.1.1 Project Work Force and Population

Construction

Project construction is expected to occur over a 39 month period. During construction, manpower needs would average approximately 650 employees per day, peaking to approximately 1,300 workers in Month 17 of construction (Table 4-26). This would make the proposed Project the largest employer within the Amargosa Valley, with the next highest being Ponderosa Dairy with approximately 120 employees.

The primary trades required for construction of the proposed Project will include pipefitters, skilled and unskilled laborers, electricians, carpenters, cement finishers, equipment operators, sheet metal works, ironworkers, and truck drivers. The proposed Project would be expected to draw from available construction labor in the regional area.

Even at the peak of construction (approximately 1,300 workers), the current availability of approximately 70,000 construction workers in Nye and Clark counties in 2010 would be sufficient to meet the employment needs during construction, although a small number of workers in some specialized trades may come from outside the region. Construction of the proposed Project would require less than 2 percent of the available workforce in the regional area; thus, construction labor demand would not significantly affect the availability of construction labor in the region. In addition, Nevada and particularly the Las Vegas area have been hit hard by the recent economic downturn, which has led to high job losses in construction. Thus, a plentiful workforce is likely to be available in the region to fill the employment needs of the Project.

Operations

The proposed Project is expected to employ approximately 180 workers during operation. Some of the operations employment may involve relocation to the area for workers with specialized technical or managerial skills. Given the modest size of the workforce and the likelihood that some of these workers may already be residents of the local area, population impacts would be minor.

4.9.1.2 Population and Housing

Construction

According to an Electric Power Research Institute report titled *Socioeconomic Impacts of Power Plants*, construction workers normally commute as much as 2 hours to construction sites from their homes, rather than relocate (EPRI 1982). It is anticipated that the vast majority of the construction workforce (peak workforce of approximately 1,300 workers and an average of approximately 650 workers per day over the 39-month duration of construction) would commute to the Project area rather than relocate (Table 4-25). Thus, impacts to the loeal population are expected to be minimal, and would not induce substantial growth. Additionally, the Project area is in a remote, sparsely inhabited area and would not displace existing populations.

Table 4-25 Construction Industry Employment

	2006	2008	2010 Forecast	% Change 2006 to 2010
Nevada	141,874	118,837	85,895	
Annual Percentage Change	-	-16.2%	-27.7%	-39.5%
Las Vegas Metropolitan Statistical Area	108,430	94,149	68,392	
Annual Percentage Change	-	-13.2%	-27.4%	-36.9

Source: Nevada Department of Employment, Training and Rehabilitation: Nevada Workforce Informer 2009.

It is assumed that the majority of workers will commute from the Las Vegas metropolitan area, approximately 80 miles southeast of the Project area. A few construction workers may choose to permanently relocate to the communities near the Project area during the construction phase. These include the Town of Amargosa Valley, Beatty, and Pahrump. There are approximately 613 hotel/motel rooms and suites among 9 different establishments in the Amargosa Valley, Beatty, and Pahrump, with extensive additional temporary housing available in the Las Vegas metropolitan area. Thus, should some construction workers choose to stay temporarily at a local area motel or hotel, there would be ample transient housing.

Additional housing opportunities are available in the form of RV and mobile home sites. There are over 225 RV spaces in three locations in Amargosa Valley: Longstreet Inn & Casino, My Own Mobile Home Park, and Fort Amargosa RV Park. Additional RV spaces are available in Beatty and Pahrump. Availability varies depending on season, with greater availability during the summer months. Should a portion of the workers relocate to the area for the duration of their construction assignments, effects to available housing and population would be minor, as the 2008 residential vacancy rate was over 15 percent in Pahrump, and the 2000 vacancy rates in Amargosa Valley and Beatty were over 20 and 26 percent respectively. Because the construction workforce largely will commute to the area rather than relocate, increased demand on the local housing supply is expected to be minor.

Operations

Operation of the Project is expected to have a minor impact on the availability of regional housing due to the relatively small number of workers needed for plant operations, and the abundance of available local housing and land in the Amargosa Valley.

The proposed Project would be construeted on undeveloped BLM managed lands. Because the Project area is designated by the BLM for disposal and incorporated into the Amargosa Valley Area Plan as future energy development, the views from residential subdivisions could change, depending on existing site conditions and current viewshed. Visual impacts of the proposed Project are discussed in section 4.12. Indirect socioeconomic impacts may also include noise, air quality issues, and increased traffic.

4.9.1.3 Economy and Employment

Construction

Construction would create a temporary (up to 39 months), beneficial impact on the local economic base and fiscal resources. Construction employment wages and salaries would provide additional income to the area, as would expenditures within the ROI for construction materials and services. The construction payroll has been estimated at approximately $223.6 million over 39 months ($68.8 million estimated annually). Capital expenditures and local spending on construction materials and equipment within the ROI are estimated to total approximately $153 million over 39 months ($47.1 million estimated annually).

Construction is expected to directly create an average of approximately 650 annual full-time employment (FTE) over 39 months, with a peak monthly employment of approximately 1,300. This direct employment will create both indirect and induced secondary employment in the regional area. Indirect employment is defined as employment that will be generated by the purchase of goods and services required by the proposed Project. Induced employment is defined as employment that will be generated by the purchase of goods and services by businesses that are indirectly supported by the proposed Project.

The top 10 industries that would benefit the most in terms of the indirect and induced economic output impacts include: rental housing, whole trade businesses, real estate establishments, physicians and other medical professionals, food service, private hospitals, architectural and engineering services, insurance carriers, banks, and telecommunications.

Also, (using the assumptions above) during the construction phase the Project's estimated annual employment creation within the ROI would be as follows:

- Direct (Project) employment: approximately 650
- Indirect employment: approximately 290
- Induced employment: approximately 195
- Total employment creation: approximately 1,300

Table 4-26 Construction Workforce by Skill (Monthly)																			
Trade or Skill	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**	**M13**	**M14**	**M15**	**M16**	**M17**	**M18**	**M19**
Surveyor	0	16	12	12	16	18	17	21	21	18	20	20	25	24	18	17	14	10	12
Operator	25	51	56	58	64	92	92	97	97	97	97	97	115	107	104	104	104	104	104
Laborer	14	36	37	39	69	91	69	156	190	230	230	230	230	230	230	213	213	213	213
Truck Driver	21	17	15	16	28	30	35	44	44	36	32	29	39	40	40	40	38	38	38
Oiler	1	5	3	2	3	3	3	5	5	3	5	3	7	7	6	5	3	2	2
Carpenter	0	6	20	23	22	30	23	81	92	92	104	104	104	115	115	115	115	115	115
Boilermaker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	13	13	13
Paving Crew	-	-	-	-	6	6	-	5	-	-	-	-	5	-	-	-	-	-	-
Pipe Fitter	-	1	14	16	12	14	13	16	32	58	115	115	167	173	190	307	375	352	340
Electrician	-	0	6	12	12	13	13	18	25	28	43	52	68	108	150	169	173	173	173
Cement Finisher	-	3	14	16	15	22	17	24	44	92	92	92	92	115	115	115	115	115	115
Ironworker	-	5	12	12	12	29	29	29	48	48	48	68	68	68	68	68	68	68	68
Millwright	-	-	-	-	-	-	-	-	-	-	23	23	23	23	23	29	29	29	29
Tradesman	-	14	49	58	59	85	67	52	31	29	14	9	9	12	9	15	12	3	2
Project Manager	1	1	1	1	1	1	1	3	3	3	3	3	3	3	2	3	3	3	3
Construction Manager	1	1	1	1	1	1	1	3	3	3	3	3	3	3	2	3	3	3	3
PM Assistant	1	1	1	1	1	1	1	3	3	5	5	5	5	5	5	5	5	5	5
Support	1	1	1	1	1	1	1	3	3	5	5	5	5	5	5	5	5	5	5
Support Assistant	1	1	1	1	1	1	1	3	3	5	5	5	5	5	5	5	5	5	5
Engineer	3	3	2	3	3	3	3	10	10	9	12	12	12	12	12	12	12	14	14
Timekeeper	1	1	1	1	1	1	1	3	3	3	3	3	3	3	2	3	3	3	3
Administrator	2	2	2	2	2	2	2	7	7	7	7	7	7	7	7	7	7	7	7
Welder	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	73	166	249	**276**	**330**	**445**	**390**	**584**	**665**	**772**	**867**	**886**	**996**	**1066**	**1109**	**1254**	**1318**	**1281**	**1270**

Table 4-25 Construction Workforce by Skill (Monthly)

Trade or Skill	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39
Surveyor	13	16	14	18	16	16	8	1	3	3	1	-	-	2	3	3	3	3	-	-
Operator	104	84	81	74	74	64	47	17	10	9	5	2	2	6	8	8	8	8	2	-
Laborer	183	143	143	116	97	97	97	68	68	49	49	40	35	29	29	25	17	12	6	-
Truck Driver	38	30	29	29	26	26	18	18	17	17	17	14	14	14	12	12	6	6	3	-
Oiler	3	5	3	5	5	5	3	1	1	1	0	-	-	1	1	1	1	1	-	-
Carpenter	115	115	115	115	92	92	92	81	58	58	46	12	12	12	6	6	-	-	-	-
Boilermaker	13	13	13	13	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-	-
Paving Crew	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pipe Fitter	328	315	315	315	315	288	288	282	230	196	115	89	68	12	12	12	6	6	6	-
Electrician	162	162	146	146	129	129	62	62	52	52	41	10	10	10	6	6	6	6	6	-
Cement Finisher	115	115	92	92	92	92	92	92	81	81	81	63	29	23	12	12	-	-	-	-
Ironworker	68	68	68	49	49	23	23	23	23	23	12	12	12	12	12	12	6	6	6	-
Millwright	29	29	29	29	29	17	17	17	17	12	12	12	12	12	12	12	-	-	-	-
Tradesman	2	2	2	2	2	5	5	3	-	-	-	-	-	-	-	-	-	-	-	-
Project Manager	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	1
Construction Manager	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	1
PM Assistant	5	5	5	5	5	5	5	5	5	5	5	5	3	3	3	3	3	3	3	1
Support	5	5	5	5	5	5	5	5	5	5	5	5	3	3	3	3	3	3	3	1
Support Assistant	5	5	5	5	5	5	5	5	5	5	5	5	3	3	3	3	3	3	3	1
Engineer	14	14	14	14	14	14	14	14	14	14	10	10	10	9	10	10	9	10	9	5
Timekeeper	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	1
Administrator	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	7	6	7	6	2
Welder	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Total	**1219**	**1143**	**1096**	**1049**	**985**	**913**	**811**	**721**	**606**	**547**	**421**	**296**	**230**	**167**	**149**	**145**	**87**	**89**	**63**	**13**

These estimates were based on the 2009 Prevailing Wages for Nye County, Nevada Office of the Labor Commissioner, the Proponent's job projections for the proposed Project and the National Renewable Energy Laboratory's Job and Economic Development Impact model.

This additional employment would result from the local construction expenditures, as well as from spending by local construction workers. This indirect and induced employment is expected to be filled both locally and regionally, and would result in positive economic impacts.

Operations

As stated above, approximately 180 full-time average annual employees will be needed to operate and maintain the proposed Project, including 5 management staff; 4 administrative and clerical staff; 90 operation and power block routine maintenance staff (supervisors, specialists, engineers, operators); 28 skilled laborers (mechanics, electricians, welders); and 55 unskilled staff. It is estimated that 75 percent of the approximately 180 employees will be hired locally, with the remainder of the employees coming from outside the local area.

4.9.1.4 Public Services

Construction

The proposed Project will rely on both on-site security and the Nye County Sheriff's Department law enforcement protection services during construction. Site guards will be trained, uniformed, unarmed personnel. Their primary responsibility will be to control egress and ingress of personnel and vehicles, perform fire and security watch during off hours, and perform security badge administration. A Project-wide photo security badge system for all construction and operations personnel will be used to control security. The perimeter of the Project site will be fenced with an 8-foot-high security fence on the north and south side of the Project, and a 30-foot-high security wind fence on the east and west sides of the Project.

The proposed Project will rely on both on-site fire protection systems and local (e.g., Amargosa Valley Volunteer Fire Department) fire protection services during construction. The Amargosa Valley Volunteer Fire Department Station is located at 851 E. Amargosa Farm Road, which is approximately 1.3 miles from the southeast corner of the solar field. If needed, mutual aid would be provided by the Pahrump and Mercury fire departments. Ongoing discussions with Nye County may further define the services provided by the Amargosa Valley Volunteer Fire Department. A Construction Fire Protection and Prevention Plan will be developed and followed throughout all phases of construction. During construction, the permanent facility fire suppression system will be placed in service as early as practicable. Prior to installation of the facilities, permanent fire suppression system, fire extinguishers, and other portable firefighting equipment will be available on-site.

Operations

Project operation may moderately increase demands on local police, fire, medical, and other emergency services. However, population in-migration into the Amargosa Valley, Pahrump, and Beatty as result of the proposed Project is expected to be minimal. The modest size workforce would not be expected to have an adverse impact on demand relative to the capacity of most local public services. Additionally, the services provided by the Nye County Sheriff's Department and the Amargosa Valley Fire Department could be enhanced by emergency services in Pahrump and Las Vegas, if requested. Ongoing discussions with Nye County may further define the level of services provided by the respective county services. Project health and safety programs and fire protection systems and procedures would be expected to help reduce the need for fire, medical, and other emergency services.

4.9.1.5 Utilities

Construction

Although minimal or no population impacts are expected, there would be some demands on existing utility services during construction as a result of on-site activities. Water needed for construction would be obtained from the three private wells located southwest of the Project area. Potable water would be brought in and stored in approved water tanks. Sanitary wastes generated during construction will be collected in portable, self-contained toilets and hauled to an approved disposal site.

Operations

The proposed Project would utilize approximately 400 afy of existing groundwater currently being used for agriculture; thus, it would not impact local water supplies nor increase basin usage and represents less than 2 percent of the total perennial yield of the Amargosa Basin. Project sanitary wastes would be disposed of by an on-site septic system and leach field. Operations of the proposed Project would not impact available electrical needs; and by its very nature, would represent a net gain in regional capacity.

4.9.1.6 Schools

Construction

Since it is anticipated that the majority of construction workers would commute, rather than relocate, construction of the proposed Project is not expected to increase enrollment in area schools. Furthermore, construction workers who relocate temporarily for a work assignment typically do not bring their families with them.

The Amargosa School, a combined elementary and middle school, is within 1 mile of the Project site and had a 2009 enrollment of 194 students. High school age students in Amargosa Valley attend Beatty High School which has a 2009 enrollment of 139. The Nye County School District

is currently negotiating with the BLM to acquire 20 to 30 acres for a new school site in Amargosa Valley (Amargosa Area Plan 2009). Potential impacts during construction include increased traffic along Amargosa Farm Road, fugitive dust from construction activities, and increased noise. Construction activities will normally occur during daylight hours between sunrise and sunset.

All construction traffic will be required to use the selected access road from US 95, south to the Project site. Some residual increase in traffie along Amargosa Farm Road is anticipated, depending on the commuting route of the construction worker. Fugitive dust must be controlled per requirements of the SAD Permit and the SWPPP. Implementation of BMPs to control dust will minimize fugitive dust impacts. Mitigation measures to control dust and noise impacts are described in Appendix A.

Operations

Operation of the proposed Project is expected to have minor local and regional effects on schools because of the relatively small number of workers needed for operation of the plant (approximately 180 employees).

4.9.1.7 Fiscal Resources

Construction

Annual expenditures within the ROI on construction materials, supplies, and equipment are estimated to total $47.2 million. Total expenditures for the proposed Project within the ROI and outside the ROI over the 39-month construction period are estimated to be approximately $2 billion.

Pursuant to Nevada law AB 522, approved renewable energy projects are only required to pay sales and use tax at the rate of 2.25 percent, which is allocated in the same manner as other taxes collected under the Local School Support Tax (LSST). Over the 39-month construction period, the Project would pay approximately $45 million in sales tax to the State of Nevada for the LSST.

In addition to sales tax revenue, the proposed Project would generate for Nye County up to $34 million in property taxes during construction, after taking into account the 55 percent property tax abatement for renewable energy projects under AB 522 (Table 4-27).

Table 4-27 Property Tax Revenue during Construction		
Property Tax Dispersal	**Dispersal Percentage**	**Estimated Income**
State	45	$15,300,000
Nye County	20.24	$6,881,600
Nye County School District	20.075	$6,825,500
Amargosa Town Fund	12.1	$4,114,000
State Capital Debt and Parks	2.585	$878,900
Total		**$34,000,000**

Operations

During operation, it is expected that the annual purchases for materials supplies, equipment, and services within the ROI would total approximately $6.0 million. In the event that all purchases are made within Nye County, which has a tax rate of 7.1 percent, these expenditures would generate approximately $355,000 in annual sales tax revenue (Table 4-28).

Table 4-28 Estimated Annual Sales Tax Revenue during Operation		
Sales Tax Dispersal	**Dispersal Percentage**	**Estimated Income**
State General Fund	2	$120,000
Nye County School District	2.6	$156,000
Nye County	0.5	$30,000
Nye County Transportation & Air Quality	0.25	$15,000
Supplemental City-County Relief Tax (split between County & State based on formula)	1.75	$105,000

4.9.2 Wet-Cooled Alternative

Impacts to socio-economic resources from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).

4.9.3 No Action Alternative

Under the No Action Alternative, the BLM would not grant a right-of-way to the Proponent. The BLM land on which the Project is proposed would continue to be managed within the BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality (43 U.S.C. 1781 (b)) in conformance with applicable statutes, regulations, policy, and land use plan.

The results of the No Project/No Action Alternative would be the following:

- The impacts of the proposed Project would not occur; however, the land on which the Project is proposed would become available to other uses that are consistent with the BLM's land use plan, including another renewable energy project.
- The benefits of the proposed Project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed Project were not approved, renewable projects would likely be developed on other sites in the Mojave Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

Construction methods, resulting impacts, and regulatory requirements associated with other renewable projects would be similar to those identified for the proposed Project. However, as such, socioeconomic impacts associated with construction and operation of other renewable projects could be expected to be either similar when compared to the proposed Project (no significant impacts and providing positive fiscal benefits) or greater (resulting in significant impacts such as by causing a burden on community services). Furthermore, important public benefits discussed above under the fiscal and non-fiscal effects in the Socioeconomic Resources would not occur within the ROI.

4.9.4 Mitigation

No mitigation is required.

4.10 Environmental Justice

Information about the proportion of population that may be impacted by the alternatives and are characterized as minority and/or low-income is provided in Section 3.10. Overall, the data show that there is a slightly higher proportion of Hispanic residents in the Amargosa Valley, and there are higher proportions of low-income populations in the Amargosa Valley compared to the overall population in Nye County and Las Vegas.

4.10.1 Proposed Action

Income and revenue benefits associated with the proposed Project would be distributed throughout all areas, including EJ populations. Adverse impacts associated with the proposed Project would not be experienced disproportionately by an EJ population.

There are no special issues, such as housing, transportation access, or resouree use in the Project area that would affect the environmental justice population disproportionately.

4.10.2 Wet-Cooled Alternative

Impacts to EJ from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative).

4.10.3 No Action Alternative

Under the No Action Alternative, the right-of-way would not be granted. No project-associated impacts would occur to minority or low-income populations under the No Action Alternative.

4.10.4 Mitigation

No mitigation is required.

4.11 Land Use, Recreation, Transportation, and Access

The following section describes the potential impacts of construction and operation of the proposed Project on land use, recreation, and transportation and access within their respective ROI, as defined in Chapter 3. The impact analysis for these areas is based on review of the existing conditions and focuses on the following issues: the conformity of the proposed Project with federal and local land use plans, ordinances, and policies; and the potential for the Project to have direct and/or indirect land use, recreation, transportation, and access conflicts with existing and planned uses.

4.11.1 Proposed Action

4.11.1.1 Existing Land Use

The Project area is within the boundary of the Amargosa Valley Area Planning area; however, land requested under the Proponent's right-of-way application is entirely on public land under the jurisdiction of the BLM Pahrump Field Office. The Project area is adjacent to a low density residential area east of Sandy Lane. Smaller rural residential areas are located west of the Project area. The Proponent intends to realign Amargosa Farm Road either 250 feet or 0.25 mile south of the existing roadway, based on final engineering design. Approximately 7,000 acres of primarily undisturbed BLM desert land, currently designated as disposal areas, will be converted to utility-related uses.

No residential, commercial, industrial, or institutional uses are located within the Project area. The nearest school is approximately 1 mile from the Project area. The proposed Project will have long-term direct impacts on potential uses of BLM land within the Project area by removing public land available for disposal and dispersed recreation. Indirect impacts to recreation on public land are discussed in detail in the visual resources section of this EIS.

Minimal impacts to existing land uses, including the realignment of Amargosa Farm Road, are expected from the proposed Project.

4.11.1.2 Future Land Use

The Project area is located within an area designated by the Amargosa Valley Area Plan as a Special Development Area. The term Special Development Area is a mixed-use designation to set aside public or private areas where a variety of land uses might be proposed for approval, including projects under review by the BLM, such as Solar Energy Facilities (Amargosa Valley Area Plan Committee 2009).

Impacts to future land use include the change of land use identified by the Amargosa Valley Area Plan from future residential use south of Amargosa Farm Road, and east of Powerline Road to utility use. However, the Project is consistent with the policies, goals, objectives and land use descriptions set forth in the Amargosa Valley Area Plan as the designated Special Development Area permits the uses contemplated.

4.11.1.3 Transportation and Access

The construction of the proposed Project would have short-term direct impacts to the existing traffic load on existing roadways within the ROI. There would be an increase in vehicular traffic in relation to the existing traffic load and capacity of the street system. During construction of the proposed Project, the majority of workers are expected to commute from Las Vegas within Clark County, resulting in a direct increase in average daily traffic on US 95. Construction workers will commute as much as 2 hours to construction sites from their homes. Normal construction hours are expected to be between 8 a.m. and 6 p.m., Monday through Friday. Some activities may require extended evening construction hours and weekend work, as necessary, to meet the overall Project schedule.

During construction, access to the Project area will be via a new access road along the alignment of the T&T Road from US 95, from Amargosa Farm Road (via Valley View Boulevard) or from Powerline Road (via Anvil Road from NV 373). The proposed access road will be designed in accordance with Nye County Public Works standards, and the appropriate permits will be obtained from NDOT. As a part of the proposed Project, a portion of Amargosa Farm Road would be realigned. The proposed roadway alignment will be coordinated with Nye County Public Works and be constructed in conformance with the current standards. The locations of the principal site entry gates for both the construction and the commercial operating period will be evaluated in consultation with the BLM, NDOT, and Nye County Public Works to ensure ingress and egress from the site does not have adverse impacts on existing traffic flow patterns.

The average construction workforce is estimated at 650 individuals per day, resulting in an increase of approximately 1,300 average daily vehicle trips on US 95 or NV 373 if each worker drove alone to and from the Project site. Peak workforce levels are estimated at 1,300 individuals per day, resulting in an increase of approximately 2,600 average daily vehicle trips on US 95 if each worker drove alone to and from the Project site.

Traffic levels are expected to peak during month 17 of the 39-month construction period. Where the construction workers currently reside would determine patterns of traffic increase. Other roads in the vicinity of the Project area could potentially see increased traffic from workers travelling to and from the Project site to area services and other work-related activities.

The proposed Project is expected to employ a total of 180 workers during operation, or an estimated increase of 360 daily vehicle trips on US 95, if each work drove alone to and from the Project site.

Permanent changes to transportation networks would include improvement of the selected access road, as well as improvements on Amargosa Farm Road. There are no planned improvements to US 95 related to the proposed Project.

Short and long-term, direct and indirect impacts would result from the realignment of Amargosa Farm Road's right-of-way. Its construction would impact local residents of Amargosa Valley by restricting or rerouting access to areas served by the road during the construction of the re-alignment.

4.11.2 Wet-Cooled Alternative

Impacts to land use, recreation, transportation and access from construction and operation of a wet-cooled solar plant would be similar to the impacts described for the Proposed Action (dry-cooled alternative). It is anticipated that 4,600 afy will be required for the wet-cooled alternative. Water would most likely be acquired from existing agricultural use. The additional 4,200 afy needed over the Proposed Action would require that the fields currently being irrigated be fallowed. The Nevada State Engineer generally allots 5 afy/acre for irrigation. Therefore, under the wet-cooled alternative, approximately 840 acres in the Amargosa Desert Hydrographic Basin would be fallowed.

4.11.3 No Action Alternative

Under the No-Action alternative the Project would not be constructed, and there would be no impact to land use, recreation, or transportation.

4.11.4 Mitigation

No mitigation is required.

4.12 Visual Impact Assessment

The purpose of the visual impact assessment is to identify and characterize the level of visual impact resulting from the construction, operation, and maintenance of the proposed Project. Visual impact levels are derived by assessing the level of visual change associated with the physical elements of the proposed Project as compared to the existing setting.

Visual change is measured in terms of contrast and typically affects sensitive viewers, scenic quality, and compliance with the applicable agency visual management objectives. Contrast resulting from the proposed Project was assessed using a methodology consistent with the BLM's Manual 8431-1, Visual Resource Contrast Rating. Levels of potential contrast are largely based upon the perception of cleared vegetation, grading and topographical modifications, and the introduction of new facilities (structures) from sensitive viewing locations. The visual analysis also considered the presence of existing cultural modifications (i.e., transmission lines, industrial developments, primitive roads, etc.) and their effect on the landscape (see Figure 3-7). The following section describes the methodology used to measure potential visual impacts followed by the results of the impact assessment.

4.12.1 Visual Resource Impact Methodology

4.12.1.1 Contrast Level

The amount of visual contrast is based upon the level of modification to existing landscape character and provides the foundation for the visual contrast rating. In the context of the proposed Project, existing landscape character is defined by the visual characteristics (form, line, color, and texture) associated with the landform, vegetation, and existing facilities within, and adjacent to the Project area. Contrast typically results from (1) landform modifications that are necessary to prepare a project site for construction, (2) the removal of vegetation to construct and maintain facilities, and (3) the introduction of new above-ground facilities into the landscape.

Based on the definition of existing landscape character, the visual elements associated with the construction and operation of the proposed Project were compared to existing landscape character, resulting in levels of visual contrast as defined below (BLM 2007b). In some cases it was appropriate to identify a contrast level between two of the four levels. For example, the project may demand attention, but does not completely dominate the landscape from a given viewpoint. In this example the contrast level would be moderate/strong.

- Strong – The element contrast demands attention, will not be overlooked, and is dominant in the landscape.
- Moderate – The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- Weak – The element contrast can be seen but does not attract attention.
- None – The element contrast is not visible or perceived.

4.12.1.2 Project Contrast and Scenic Quality

In the context of the impact assessment, project contrast is defined as the overall visual change to existing features of the landscape including landform, vegetation, and structures resulting from the construction and operation of a project. Levels of visual change can range from none to moderate to strong. As such, project contrast becomes the baseline line for assessing impacts to scenic quality and sensitive viewers.

Due the relatively large size of the proposed Project, impacts to scenic quality considered not only the Project area, but adjacent land as well. Typically, impacts to scenic quality are based on project contrast (overall visual change) resulting from the construction and operation of the proposed Project. The level of project contrast contributes to the modification of existing landscape character (setting); therefore, the landscape's inherent aesthetics may be reduced and impacts may occur. The visual elements (form, line, color, and texture) associated with three major components of the proposed Project (i.e., power block, solar collectors, and transmission line) were evaluated in context with the existing visual elements of the Project site (Class C – creosote flat) and the resulting level of impact was documented.

Sensitive Viewers

Impacts to sensitive viewers and their associated KOPs were identified using the following criteria:

- viewer sensitivity (high or moderate)
- distance of sensitive viewer from the Project (foreground, middleground, or background)
- viewing position (superior or inferior views)
- visibility (screened or backdropped views)
- Project contrast (overall visual change)

The consideration of these elements resulted in a contrast level rating, or level of perceptible Project contrast for each KOP, consistent with the BLM's VRM Manual H-8431-1, Visual Contrast Rating.

For sensitive viewers with level views of the proposed Project, as distance from the Project increases the perception of project contrast decreases due to the relatively low profile of the solar collecting arrays. The Project tends to be less dominant in the landscape because a level viewer would not see the overall surface of the solar collection fields, which based on the time of the day, produce strong color contrast by replicating the typically blue skies. Based on field observations, the different components of the Project, and typical climatic patterns for Amargosa Valley, Project-specific distance zones were identified within the framework of BLM-specified distance zones as specified below.

Distance Zones

As stated, Project-specific distance zones were generated within the framework of BLM criteria for moderate and high sensitivity viewers including:

- 0 to 0.25 mile – BLM Foreground Zone
- 0.25 mile to 1 mile – BLM Foreground Zone
- 1 mile to 3 miles – BLM Foreground Zone
- 3 to 5 miles – BLM Middleground Zone
- 5 miles and beyond – BLM Background Zone

Distance zones are critical in providing context for the proposed Project within the landscape. Within the foreground distance zone of 0 to 0.25 mile, the Project is in close proximity to the

viewer which, for a project of this scale, results in strong contrast. Within the context of Amargosa Valley, views of the Project within the 0.25 to 1 mile distance zone become screened by the typically large ornamental vegetation and residential/commercial construction to the east and south of the Project area. The low profile of the Project resembles the natural horizon line the farther the viewer is located from the Project site. The power blocks may be visible in this distance zone if unobstructed viewing conditions exist and the viewer is superior enough to see over the solar collecting arrays and 30-foot wind fence. However, due to the existence of cultural modifications in the landscape including, but not limited to, residential structures, existing utility lines, cell towers, etc., project contrast may be reduced if the Project is seen within the context of such cultural modifications.

In addition to distance, and in the context of solar projects, viewing position or elevation of the viewer as compared to the elevation of the project, influences the perception of Project contrast because viewers at higher elevations tend to see larger portions of the Project within the context of the existing setting. The strongest contrast element for the proposed Project is color associated with the mirrors which predominantly reflect the typically blue Mojave Desert sky. Conversely, sensitive viewers that are inferior to the Project (i.e., looking up at a projeet) would have reduced visibility of Project facilities; thus contrast is reduced. Other viewing conditions that contribute to contrast include screening (views that are blocked), backdropping (natural features behind the Project, typically darker than Project elements), and skylining (sky behind Project elements – typically providing a silhouette). Factors such as levels of visual eontrast, distance zones, viewer sensitivity, and viewing conditions were considered in the determination and characterization of the level of perceived visual contrast.

Determination of Impacts

Sensitive viewer impacts consider the sensitivity of the viewer and the perception of project contrast based on distance and associated viewing conditions within the context of the existing setting. Using BLM form 8400-4 (Visual Contrast Rating Worksheet) perceived contrast was characterized and documented per BLM guidance. Perceived contrast was combined with viewer sensitivity, to determine visual impacts to sensitive viewers.

To represent and validate the range of potential visual impacts resulting from the construction and operation of the proposed Project, five photo simulations were prepared per BLM direction and are located in the following section. The simulations were prepared based on high-resolution photography and corresponding GPS data gathered during field investigations. The photographs were taken using a 50mm lens whieh best replicates the perspeetive and depth-of-field associated with the human eye. After the proposed KOP and simulation photographs were approved by BLM visual resource staff, the simulations were prepared using a proponent-provided 3D model of the proposed facilities combined with Project spatial data and 30-meter terrain models using a combination of GIS and Computer Aided Design (CAD). After construction of the 3D model associated with the Project, the Project model was combined or composited with the high-resolution photograph using a 3D rendering program. The location of the Project model in the photograph was validated using existing terrain and existing structure (distribution lines) data that was gathered during field investigations. The simulated model was then rendered using appropriate textures, lighting based on the time that the photographs were taken, and representative atmospheric conditions.

Compliance with VRM Classifications

Compliance with VRM classifications was assessed by evaluating project contrast as perceived by sensitive viewers and their associated KOPs (Table 4-29). Per BLM requirements, contrast rating sheets (BLM 2007b) were prepared from KOPs that demonstrate compliance with VRM classes (see Appendix D).

Table 4-29 Compliance with Agency Management Objectives

Contrast Level	VRM Class			
	I	II	III	IV
Strong	No	No	No	Yes
Moderate/Strong	No	No	Yes	Yes
Moderate	No	Yes	Yes	Yes
Weak/Moderate	No	Yes	Yes	Yes
Weak	Yes	Yes	Yes	Yes

4.12.2 Proposed Action

Structural facilities for the Project include solar collection fields which include two power blocks in the center of each solar field, and associated facility building at the south end of the solar field along Amargosa Farm Road. Construction of the proposed Project would require the removal of vegetation and land grading to achieve a level grade for the entire Project area. An existing local road (Amargosa Farm Road) would be realigned either 250 feet or 0.25 miles south of its current location for the length of the Project, with proposed buildings on both the north and south side.

4.12.2.1 Project Contrast

The proposed Project would introduce a moderate/strong level of project contrast resulting from the introduction of the solar fields, power blocks, and associated Project components (including perimeter drainage channel). The regular geometric forms and strong horizontal lines associated with the solar fields would occur as a result of clearing primarily creosote bush within the Project area and the construction of the solar arrays. At certain times of the day the blue reflection of the sky would strongly contrast in color with the surrounding landscape, which is predominately dark green (vegetation) to beige (soils and/or unpaved roads). The introduction of geometric and formal lines and forms associated with the power blocks would result in moderate/strong contrast when compared to the diagonal and angular lines associated with adjacent scenery (Funeral Mountains).

Overall, the construction and operation of the proposed Project would result in a moderate/strong level of project contrast; however, in the context of sensitive viewers, perceived contrast is anticipated to range from primarily weak to moderate because the proposed Project would:

- be located in primarily the middleground to background distance zone of sensitive viewers (exceptions include the residences east of Sandy Lane and Valley View Road)
- occur near existing modifications in the landscape (e.g., residential area, transmission lines, and other utility/industrial/agricultural facilities) that have locally modified the setting
- be constructed on land with minimal topographic variation occupied by primarily low growing, evenly spaced Mojave desert vegetation (i.e., creosote bush)
- occur at an elevation where viewers would have level (neutral) views of the Project; therefore, the majority of the Project would be screened by existing landscape features (i.e. vegetation, topography, munieipal development, ete.)

In addition to project contrast associated with the proposed facilities, operation of the Project requires nighttime lighting for safety and security during routine maintenance of the solar panels. Project lighting would be designed to provide the minimum illumination needed to achieve safety and security objectives. Lighting would be shielded and oriented to focus illumination on the desired areas (predominately the power block), thus minimizing additional nighttime illumination in the site vicinity. The following results for the visual impaet assessment are organized by scenic quality, sensitive viewer type, and VRM Class compliance.

Nighttime Lighting

Nighttime lighting conditions will be slightly brighter than the nearby developed gravel operations, which are the brightest point-source of nighttime lighting in the Projeet area; therefore, contrast is anticipated to be moderate/high from a regional context. The nighttime operations are anticipated to be lighting of the power block for operational safety and security purposes and occasional lighting for the cleaning of the mirrors. Project construction is anticipated to occur during normal Monday thru Friday daytime working hours; but if nighttime lighting is needed for construction, any lighting will be directed to the center of the construction area and would be shielded. The nighttime operations of the proposed Project are anticipated to introduce a new souree of nighttime lighting to the local Project area; therefore, contrast is anticipated to be high on a limited basis.

Scenic Quality

The proposed Project would be located within a BLM-designated Class C landscape (see Figure 3-18) where primarily flat to low rolling topography is occupied by primarily low-growing creosote shrubs. The loeal setting has been modified by several existing distribution lines, residential and community services facilities, transportation routes, and agricultural fields. Regionally, industrial facilities such as Valley Substation to the south and the Johnnie substation to the southeast, several gravel mining facilities, and disbursed residential and community facilities have modified the setting by introducing vertical and horizontal structures into a primarily low profile landscape. Due to the large scale of the Project and the modifications required to construct the Project (i.e., removal of all vegetation where the solar fields are proposed), project contrast is anticipated to be moderate/strong; however, because the land in which the proposed Project would be located has been designated as Class C, and existing

landscape character has been modified by human development at both the local and regional levels, impacts to scenic quality are anticipated to be moderate.

Sensitive Viewers

Impacts to sensitive viewers are anticipated to range from predominately low, where moderate/strong project contrast would be imperceptible due to distance or screening, to limited areas of high, where high sensitivity viewers have unobstructed views of the Project in the foreground (0-.25 mile) distance zone. The regular geometric forms associated with the solar fields and dry-cooling system would contrast strongly with the irregular, organic forms associated with the landscape setting. In addition, color contrast associated with the solar arrays would vary throughout the day as the parabolic mirrors that comprise the arrays track the sun from east to west and reflect the typically blue sky. In limited situations, glare associated with the reflection of the sun would increase contrast and could occur based on viewer position (typically elevated above the project), angle of solar arrays, and atmospheric conditions. It is anticipated that sensitive viewers would have direct to screened views of the solar arrays at a vertical to near vertical position in the early morning (from the east) and late evening (from the west). Hence, the highest impacts are anticipated to occur during these times within the foreground (0 to 0.25) project specific distance zone. A 30-foot tall wind fence is proposed along the eastern and western perimeters; depending on final design and construction, the wind fence could reduce contrast by partially screening the views of the solar facility in the foreground distance zone. Viewers with a superior viewing position would likely perceive moderate/strong project contrast as compared to a level viewing condition. Thus, impacts for those viewers with superior viewing positions would be higher as compared to viewers at the same distance with a level viewing position. Impacts to sensitive viewers are described below.

Travel Routes

U.S. Routes

- **US 95 (KOP3, KOP 7)** – Contrast is anticipated to be weak/moderate for moderate sensitivity viewers traveling along US 95. The Project would be viewed from a level viewing position for a short duration in the middleground to background distance zone. At its closest point, the Project would be located approximately 5 miles from this travel route. Due to the low, horizontal nature of the solar arrays seen in context with the vast horizon lines associated with the Basin and Range, contrast would be weak. At certain times of the day, color contrast would increase as the solar arrays track the sun from west to east, and reflect the typically blue sky of the Great Basin. The cooling towers associated with the power blocks would be partially- to fully- skylined increasing contrast in form, color, and line as illustrated on Figure 4-5 A,B. Therefore, overall impacts are anticipated to range from low to moderate/low.

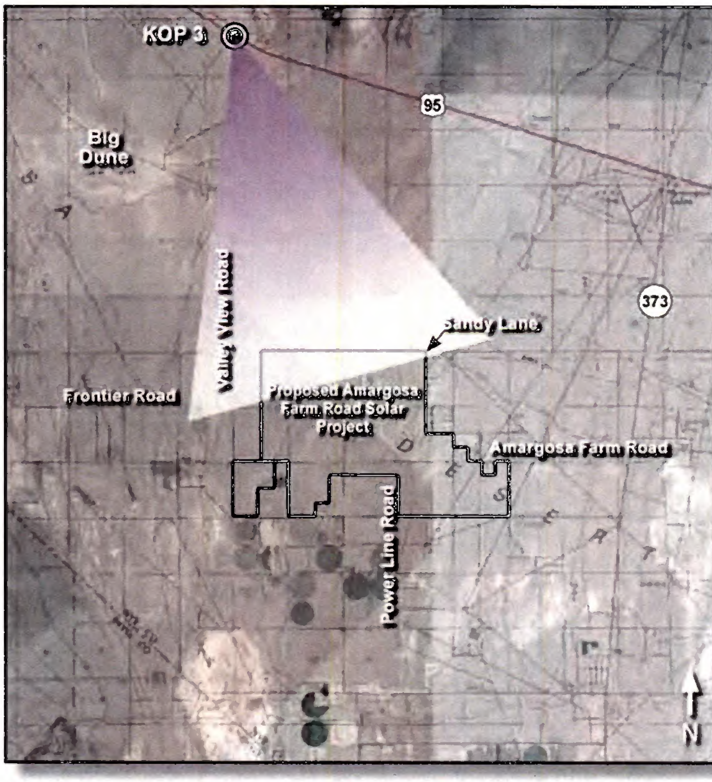
Existing Condition – View facing south-southeast from eastbound US 95 toward existing distribution lines and 230kV transmission lines

Simulated Condition – Proposed wind fence, solar fields, thermal energy storage tanks, 250 MW power blocks and associated transmission lines, switchyard, and maintenance building. Viewpoint is approximately 6.8 miles to nearest power block

Photo Date and Time: 12-14-09, 2:39 p.m. Solar Collector Angle: 40 degrees from vertical Atmospheric Conditions: Clear Focal Length: 50mm
Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.
This simulation represents the preliminary site plan dated 12-22-09, which will be refined and finalized throughout the NEPA process.

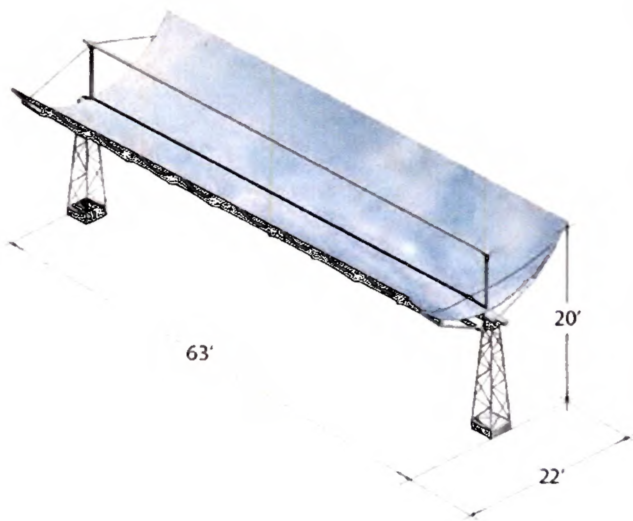
Solar Millennium LLC epg

Amargosa Farm Road Solar Project
Key Observation Point Simulation 3
Figure 4-5A
DRAFT March 2010



Photograph Location: Viewing south-southeast from the intersections of eastbound US 95 and Valley View Road, Amargosa Valley, Nevada.

Solar Collector Assembly



Typical Solar Collector Assembly based on 3D model provided by Solar Millennium, LLC. Measurements are approximate.

Solar Millennium LLC

epg

Amargosa Farm Road Solar Project
Key Observation Point Simulation 3
Figure 4-5B
DRAFT March 2010

Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.

State Highway Routes

- **NV 374 (see KOP 14)** – Contrast is anticipated to range from weak to weak/moderate for travelers using NV 374. The proposed Project would be located in the background distance zone (approximately 25 miles) from the viewer where atmospheric conditions and terrain reduce visibility. The reflective nature of the solar arrays would reflect the sky in the afternoon, resulting in a potential increase in contrast to weak/moderate. Based on these conditions, and the sensitivity of the viewer, impacts are anticipated to be low.

- **NV 160 (KOP 11)** – For moderate sensitivity travelers using NV 160, contrast would be weak with slightly superior views of the Project in the background distance zone (15+ miles). Atmospheric conditions may reduce visibility of the Project intermittently throughout the year. The Project would be partially screened by topography (unnamed hills approximately 8 miles from Project site), further reducing Project contrast. Therefore, impacts to this moderately sensitive travel route are anticipated to be low.

- **NV 373 (KOP 10)** – Contrast is anticipated to range from weak to weak/moderate for moderate sensitivity viewers returning from Death Valley Junction. The Project would be viewed from a level viewing position in the middleground (see KOP 10) to foreground distance zone(s). Visibility of the Project would be partially screened by topography and/or vegetation associated with residential land uses as travelers head north. Although portions of the solar fields and the taller power block components would be seen as travelers get closer to the Project site, existing residential structures, commercial development, town infrastructure (i.e., cell towers), and vegetation reduce Project contrast. Therefore, impacts to travelers using NV 373 are anticipated to range from low to low/moderate.

- **CA 127 (KOP 13)** – Contrast is anticipated to be weak for moderate sensitivity viewers using CA 127. The Project would be viewed from a level viewing position in the background (approximately 18 miles) distance zone. Visibility of the Project would be partially obscured by topography between the Project and the viewer, although the taller power block components could be perceptible on a clear day. Therefore, low impacts are anticipated.

- **Lathrop Wells Rest Park (KOP 2)** – Moderate Sensitivity viewers are anticipated to have level views of the Project in the background (5.5 miles) distance zone. The Project would be partially screened by topography and the out-buildings associated with the rest area based on the location of the viewer within the rest area. Farm-related structures are located between the rest area and the Project, which further reduces Project contrast. Impacts are therefore anticipated to be low as illustrated on Figure 4-6 A,B.

Existing Condition – Facing southwest from Lathrop Wells Rest Area toward NV 373, existing distribution lines, and the Funeral Mountains

Simulated Condition – Proposed 250 MW power blocks
Viewpoint is approximately 6.75 miles from nearest power block

Photo Date and Time: 12-14-09, 10:04 a.m. Solar Collector Angle: 15 degrees from vertical Atmospheric Conditions: Clear Focal Length: 50mm
Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.
This simulation represents the preliminary site plan dated 12-22-09, which will be refined and finalized throughout the NEPA process.

Solar Millennium LLC

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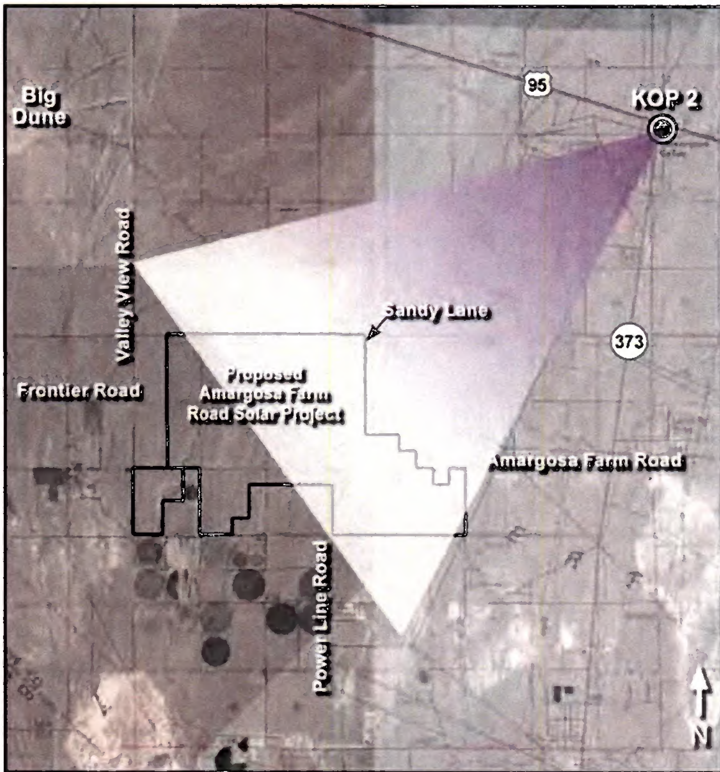
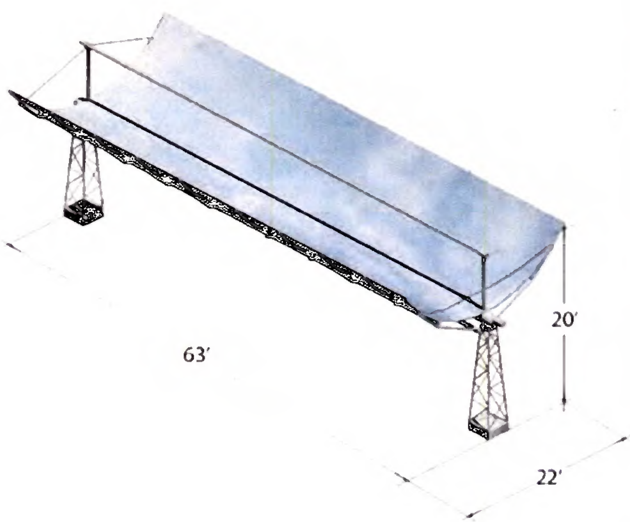
Amargosa Farm Road Solar Project
Key Observation Point Simulation 2
Figure 4-6A
DRAFT March 2010



Photograph Location: Viewing southwest from Lathrop Wells Rest area on US 95 and NV 373, Amargosa Valley, Nevada.

Solar Collector Assembly



Typical Solar Collector Assembly based on 3D model provided by Solar Millennium, LLC. Measurements are approximate.

Solar Millennium LLC

Amargosa Farm Road Solar Project
Key Observation Point Simulation 2
Figure 4-6B
DRAFT March 2010

Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.

Local Access Routes

- **Sandy Lane (see KOP 1)** – Moderate/Strong contrast is anticipated for the moderate sensitivity viewers that would have level views of the proposed solar fields, power blocks and their associated transmission lines, and wind fence in the foreground distance zone. The Project would be seen primarily by residents traveling to and from their homes along Sandy Lane with unobstructed views of the Project. The wind fence would be 30 feet tall and approximately 600 feet from the edge of the road, obscuring western views of the Funeral Mountains. The semi-transparent material of the wind fence would mute the color, line, and forms associated with the solar troughs throughout the day; therefore, Project contrast may be reduced. Based on the close proximity to the Project, high impacts are anticipated.

- **Amargosa Farm Road (KOP 6, KOP 9)** – Moderate/Strong contrast is anticipated for the moderate sensitivity viewers that would have level views of the proposed solar fields, power blocks , and administrative buildings in the foreground distance zone. Changes to landform and vegetation color and texture would be weak, and changes to vegetation line and form associated with the wind fence would be moderate from KOPs 6 and 9. However, as travelers head east or west respectively through the Project site (i.e., between administrative and maintenance buildings and the solar fields), landform, vegetation, and structure contrast would increase based on direct, unobstructed views into the proposed facility. Impacts, therefore, would be moderate/high based on the juxtaposition of the Project and the viewers.

- **Valley View Road** – Moderate/Strong contrast is anticipated for the moderate sensitivity viewers commuting to and from their residences. The Project would be located immediately to the east of the road within the context of Amargosa Valley. The power block, and more specifically the dry-cooling unit, would be visible above the wind screen, resulting in strong form and color contrast. Additionally, commuters, both north and south-bound, heading towards the Project in the foreground distance zone, would see the solar fields, as well as portions of the power blocks through the proposed chain link fence. Based on the close proximity and visibility of the Project, high impacts are anticipated to occur.

Recreation Areas

- **Ash Meadows Wildlife Refuge (KOP 12)** – The view from KOP 12 is inferior as compared to the Project site from this background distance zone (10 to 15 miles) view. The Project features would be screened from high sensitivity viewers due to topography and vegetation in the vicinity around the Ash Meadows NWR area, as well as topography changes between the Project and the KOP. The effect of the Project is expected to be weak from this view. Overall impacts are anticipated to be low.

- **Death Valley National Park** – There are no views anticipated for high sensitivity viewers with background views from the official recreation areas of the park due to complete screening from topography. Overall impacts are anticipated to be low.

- **Big Dunes (KOP 4)** – Weak/moderate contrasts are anticipated for moderate sensitivity users of the Big Dunes OHV area. Views of the Project would be unobstructed in the middleground distanee zone (approximately 3.5 miles). The primary components that are discernable from this KOP are the dry-cooling units associated with the power blocks resulting in weak/moderate form and line contrast as illustrated on Figure 4-7 A,B. The solar fields and their associated transmission lines are backdropped by the Resting Spring Mountain and resemble the existing horizon line. Although the dry-cooling units are visible, the regional setting would still remain intact; therefore, impacts would be moderate/low.

- **Funeral Mountains Wilderness (KOP 15)** – The Project, as seen from KOP 15, the Funeral Mountains Wilderness, is expected to result in moderate contrast in the background distance zone (13 miles). Due to the north-south orientation of the solar troughs, the blue color that results from the reflection of the sky would be minimized except during mid-day hours. In addition, glare may occur late in the afternoon which would increase contrast for a limited time. The major power bloek elements would be seen, but their visual contrast would be reduced due to the distance, the power block's neutral color, and backdropping. Therefore, overall impacts are anticipated to be moderate.

- **Amargosa River ACEC** – The Project would not be visible from this ACEC; therefore, impacts would be minimal.

Residences

- **Valley View Estates (KOP 5)** – The Project would result in moderate/strong contrast within the foreground distance zone of high sensitivity residential viewers. Residences would have level, unobstructed views of the Project facility due to the flat character of the existing landscape and low-growing, evenly spaced vegetation.. Due to the large scale of the Project, structure contrast would be the dominant visual element. Specifically, views would comprise the solar fields and the top portion of the dry-cooling units as depicted in Figure 4-8 A,B. Views of these components would be partially muted by the opaque material associated with proposed wind fence. In addition to the moderate/strong contrast, construction and operation of the Project would partially to fully obstruet views of the Spring Mountains to the east-southeast from residences within Valley View Estates; and therefore, impacts are anticipated to be high.

- **Sandy Lane (KOP 1)** – The Project would result in moderate/strong contrast within the foreground distance zone from residences along Sandy Lane. Due to the close proximity of the Project to the residences (approximately 700 feet), the wind fence and solar fields would obscure the power block and associated dry-cooling unit although contrast in line, form, and color would still be evident. Additionally, existing views of the Funeral Mountains to the west would be dominated by the Project with line and form contrast being the dominant visual elements as depicted on Figure 4-9 A,B. Therefore, impacts to residences along Sandy Lane are anticipated to be high.

- **Residences East of Sandy Lane (KOP 8)** – Views of the Project from residences east of Sandy Lane would range from direct and unobstructed to completely screened in the foreground distance zone. Moderate/Strong contrast would be associated with those residences with unobstructed views of the project and therefore impacts would be high (similar to those residences along Sandy Lane). Contrast would be incrementally reduced for those residences whose views of the Project would be partially- to fully- screened by the dense ornamental vegetation typical of Amargosa Valley. Therefore, impacts are anticipated to range from low to moderate to high.

- **Residences south of Amargosa Farm Road** – Residences are sporadically located from 1 to 5 miles south of Project site. Generally, views of the Project would be partially- to fully-screened by the ornamental vegetation typical of Amargosa Valley. For those residences that do have views of the Project, structure contrast would be low/moderate because the proposed facilities would be seen in context with the different components of the existing setting (e.g., cell towers, residences, agricultural facilities, etc.) which have similar visual elements as compared to the Project. Therefore, overall impacts are anticipated to range from moderate/low to low based on the level of screening and the context in which the Project is seen.

Community Facilities

- **Amargosa Elementary School and adjoining Community Center** – Views of the Project for this moderate sensitivity viewing location are anticipated to be partially to fully screened in the foreground distance zone (1 mile). Dense vegetation around residences to the west of the school would reduce the perception of project contrast. Impacts, therefore, are anticipated to be low/moderate.

- **Community Park, Amargosa Senior Center, and AVIA Community Center** – Viewers from these locations would have partially screened to screened views of the Project based on the occurrence of vegetation, residences, and community facilities. Views of the Projects ancillary facilities proposed along Amargosa Farm Road, including the switchyard, administrative building, and assembly hall could be direct and unobstructed. However, contrast associated with these facilities is anticipated to be weak/moderate, because the visual elements associated with these features would be similar to existing features found within the town of Amargosa Valley. Moderate contrast would occur in those locations that the dry-cooling units would be visible. Therefore, impacts would range from low to moderate based on the visibility of the aforementioned Project components.

Existing Condition – View facing southeast from Big Dune Recreational Area

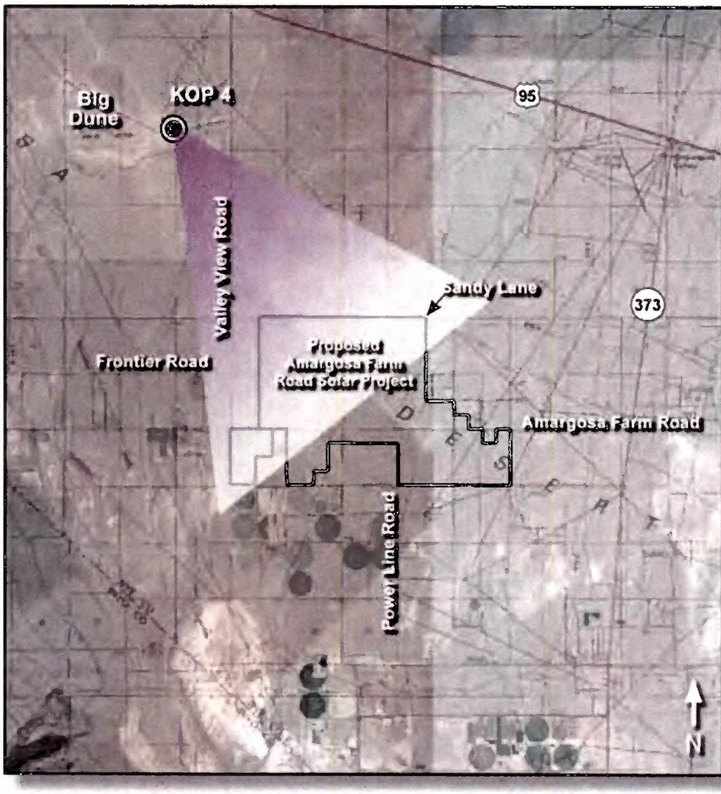
Simulated Condition – Proposed wind fence, solar fields, thermal energy storage tanks, 250 MW power blocks and associated transmission lines, and switchyard
Viewpoint is approximately 5.0 miles to nearest power block

Photo Date and Time: 12-14-09, 2:51 p.m. Solar Collector Angle: 40 degrees from vertical Atmospheric Conditions: Clear Focal Length: 50mm
Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.
This simulation represents the preliminary site plan dated 12-22-09, which will be refined and finalized throughout the NEPA process.

Solar Millennium LLC

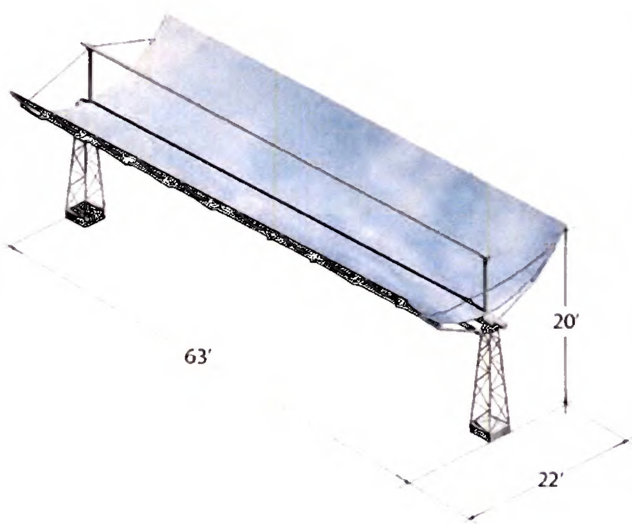
epg

Amargosa Farm Road Solar Project
Key Observation Point Simulation 4
Figure 4-7A
DRAFT March 2010



Photograph Location: Viewing southeast from Big Dune Recreational Area, 1 mile west of Valley View Road, Amargosa Valley, Nevada.

Solar Collector Assembly



Typical Solar Collector Assembly based on 3D model provided by Solar Millennium, LLC. Measurements are approximate.

Solar Millennium LLC

epg

Amargosa Farm Road Solar Project
Key Observation Point Simulation 4
Figure 4-7B
DRAFT March 2010

Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.

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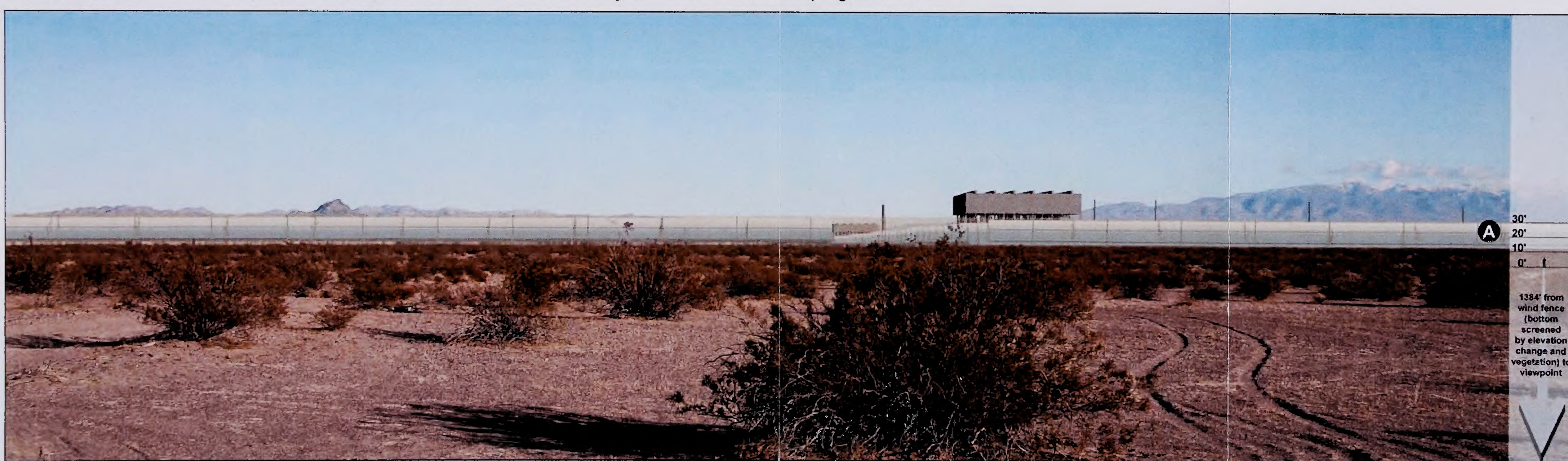
Existing Condition – View facing east from Valley View Estates toward the existing distribution line and the Spring Mountains



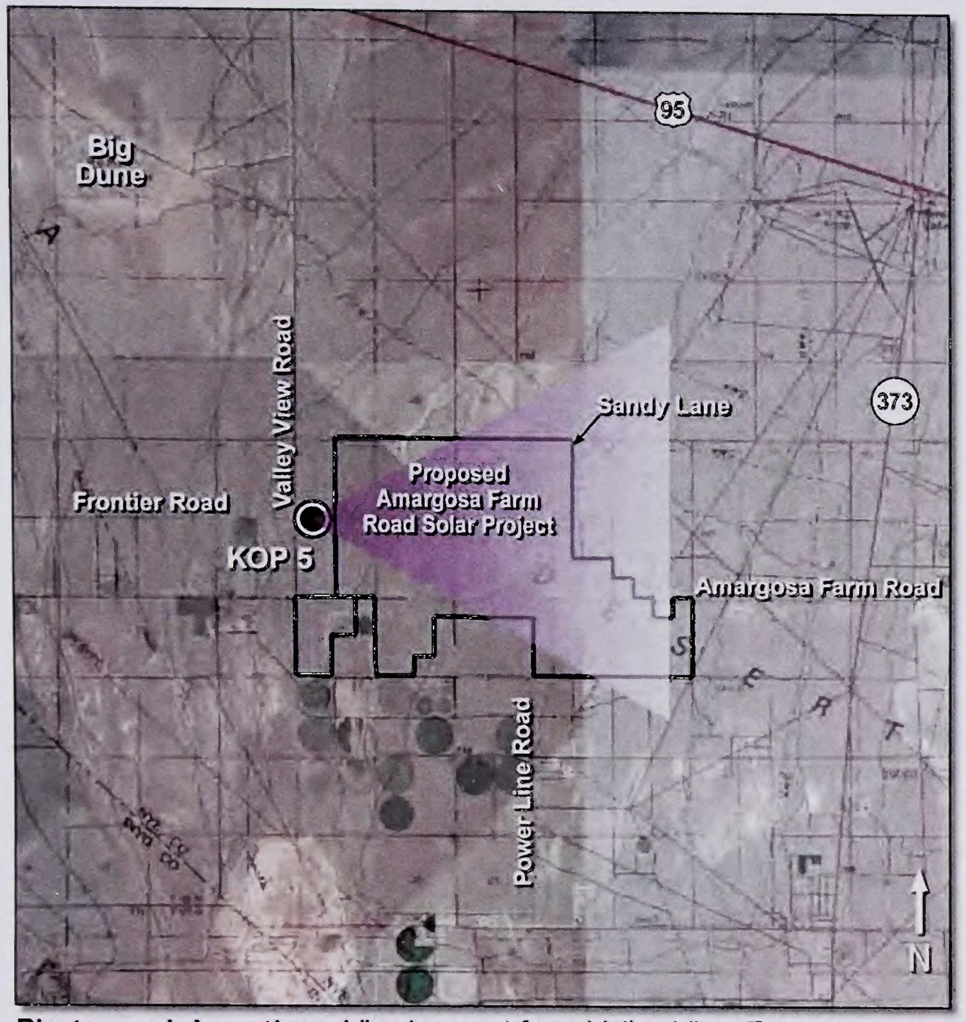
Simulated Condition – Proposed wind fence (30 feet tall), solar fields, 250 MW power blocks and associated transmission lines
Viewpoint is approximately 0.25 mile from fence and 0.94 mile from power block

Photo Date and Time: 12-14-09, 3:06 p.m. Solar Collector Angle: 40 degrees from vertical Atmospheric Conditions: Clear Focal Length: 50mm
Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.
This simulation represents the preliminary site plan dated 12-22-09, which will be refined and finalized throughout the NEPA process.

Solar Millennium LLC

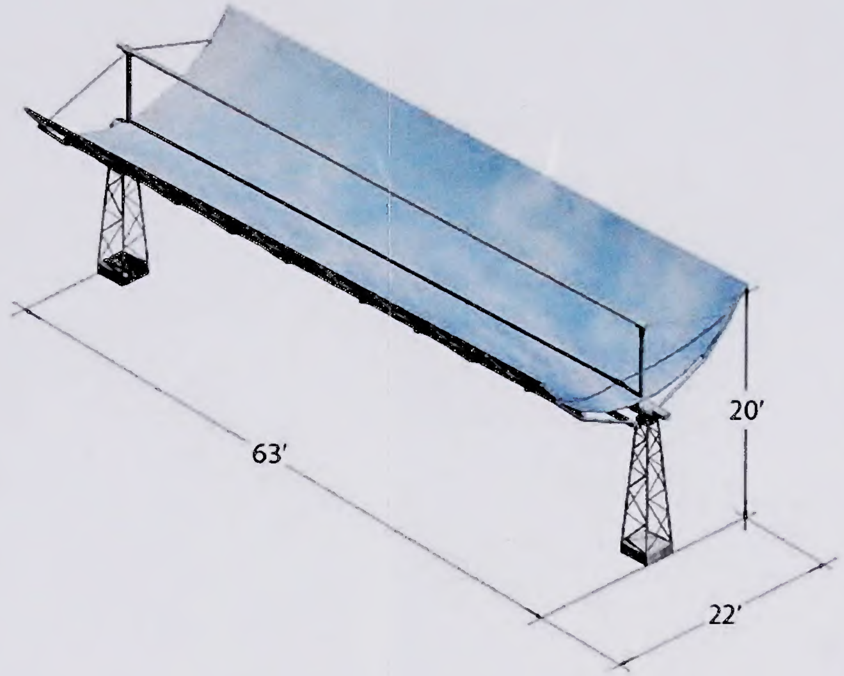
epg

Amargosa Farm Road Solar Project
Key Observation Point Simulation 5
Figure 4-8A
DRAFT March 2010



Photograph Location: Viewing east from Valley View Estates residential area at Frontier Road, 0.25 mile east from Valley View Road, Amargosa Valley, Nevada.

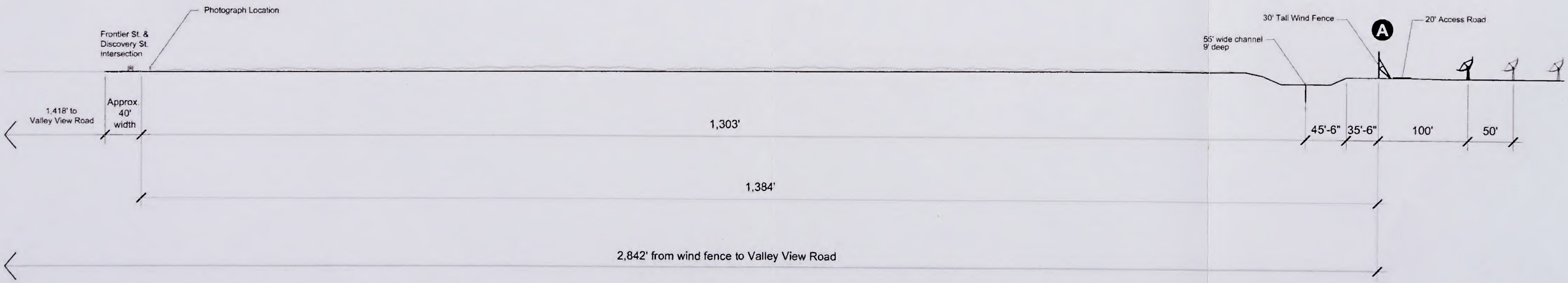
Solar Collector Assembly



Typical Solar Collector Assembly based on 3D model provided by Solar Millennium, LLC. Measurements are approximate.

Solar Collector Assembly

Typical Solar Collector Assembly based on 3D model provided by Solar Millennium, LLC. This solar collector's mirror is rotated to represent the angle of the mirrors shown in KOP 5 photograph.



Cross Section – Frontier St. and Discovery St. intersection to perimeter channel, wind fence (30 feet tall), access road, and solar collectors

Photo Date and Time: 12-14-09, 3:06 p.m. Solar Collector Angle: 40 degrees from vertical Atmospheric Conditions: Clear Focal Length: 50mm
Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.
This cross section represents the preliminary site plan dated 12-22-09, which will be refined and finalized throughout the NEPA process.

Solar Millennium LLC epg
Amargosa Farm Road Solar Project
Key Observation Point Simulation 5
Figure 4-8B
DRAFT March 2010

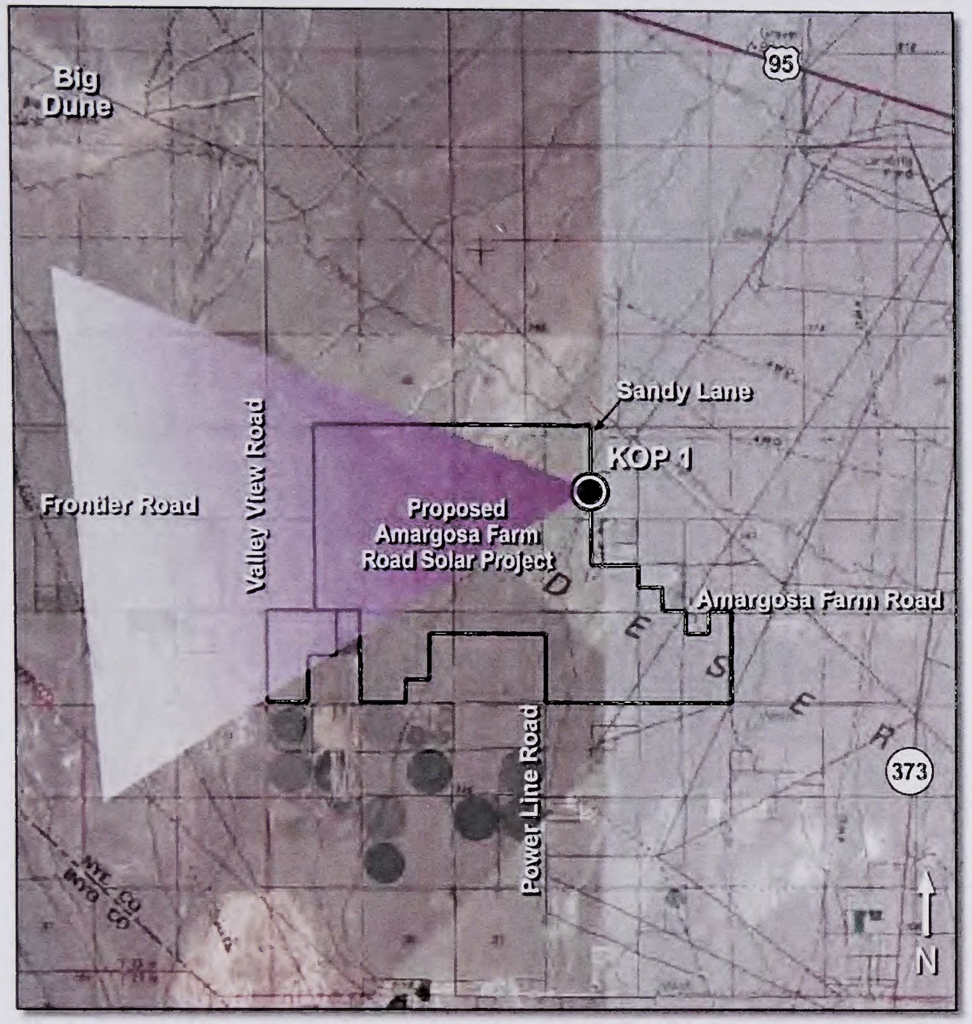
Existing Condition – Facing west from Sandy Lane Residential Area toward Sandy Lane, BLM lands, existing distribution line, and the Funeral Mountains

Simulated Condition – Proposed perimeter channel (screened by vegetation), wind fence (30 feet tall), solar fields, and thermal energy storage tanks
Viewpoint is approximately 720 feet from wind fence and 0.9 mile from nearest power block (obscured by solar fields and wind fence)

Photo Date and Time: 11-23-09, 10:33 a.m. Solar Collector Angle: 15 degrees from vertical Atmospheric Conditions: Clear Focal Length: 50mm
Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.
This simulation represents the preliminary site plan dated 12-22-09, which will be refined and finalized throughout the NEPA process.

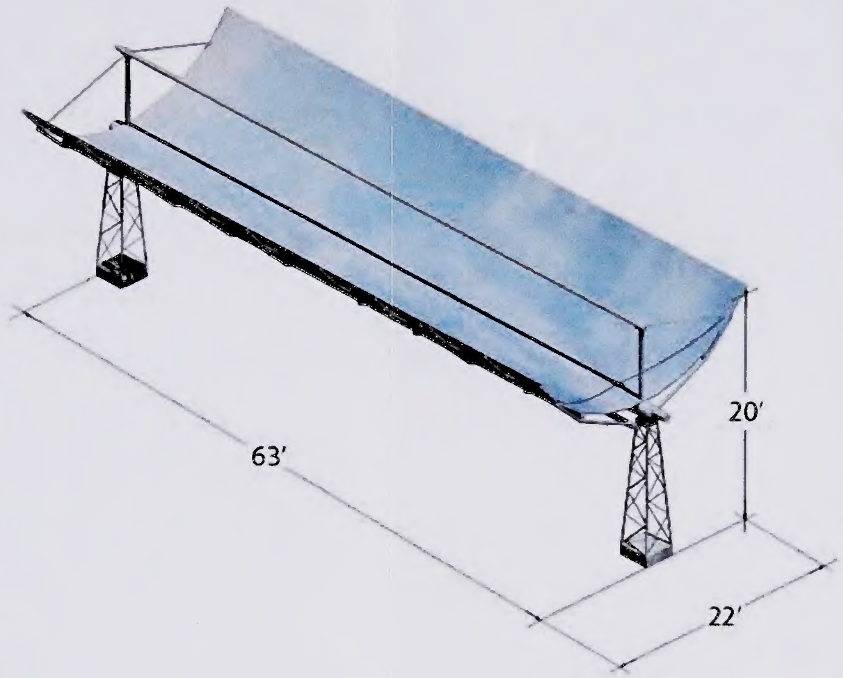
Solar Millennium LLC

Amargosa Farm Road Solar Project
Key Observation Point Simulation 1
Figure 4-9A
DRAFT March 2010



Photograph Location: Viewing west from a residential area at Sandy Lane, 0.32 mile north of Frontier Road, Amargosa Valley, Nevada.

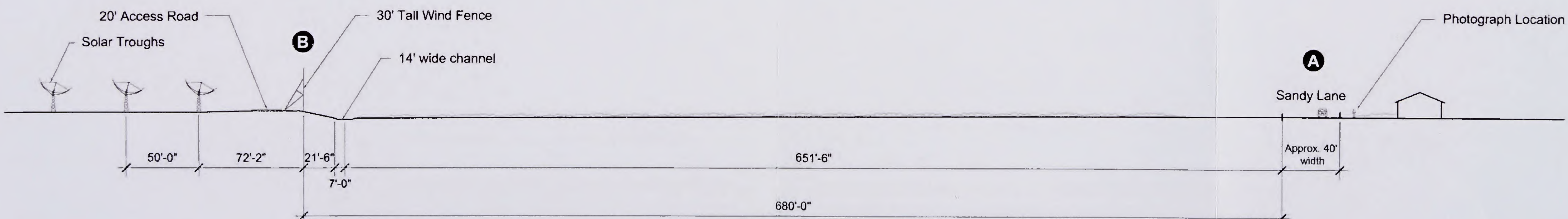
Solar Collector Assembly



Typical Solar Collector Assembly based on 3D model provided by Solar Millennium, LLC. Measurements are approximate.

Solar Collector Assembly

Typical Solar Collector Assembly based on 3D model provided by Solar Millennium, LLC. This solar collector's mirror is rotated to represent the angle of the mirrors shown in KOP 1 photograph.



Cross Section – Sandy Lane to perimeter channel, wind fence (30 feet tall), access road, and solar collectors

Photo Date and Time: 11-23-09, 10:33 a.m. Solar Collector Angle: 15 degrees from vertical Atmospheric Conditions: Clear Focal Length: 50mm
Structure models that were used in the simulations were created using 3D Models provided by Solar Millennium, LLC.
This cross section represents the preliminary site plan dated 12-22-09, which will be refined and finalized throughout the NEPA process.

Solar Millennium LLC

Amargosa Farm Road Solar Project
Key Observation Point Simulation 1
Figure 4-9B
DRAFT March 2010

Historic Features

- **Rhyolite and Rhyolite Cemetery (KOP 14)** – Contrast is expected to be weak in those locations in which the proposed Project would be visible in the background distance zone (25 miles). Viewers would have partially screened to screened views based on topography, although views would be from a superior vantage point. The Project would be completely backdropped due to the viewing angle, but the reflective nature of the solar mirrors could possibly be seen reflecting the sky in the afternoon which would raise contrast to weak/moderate for a short duration of time. An existing landfill is 0.5 miles east of the cemetery, which dominates the view towards the Project site. Impacts are anticipated to be low for viewers within both the Town of Rhyolite and the Rhyolite Cemetery.

4.12.2.2 Compliance with Visual Resource Management Objectives

The proposed Project would be located on BLM land designated as Class IV. Compliance with VRM objectives for Class IV designated land is anticipated because the proposed Project would be located in a Class IV landscape with the following management objective: *provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high* (BLM 2007b). The contrast and resulting impacts identified through the visual assessment range from low in those locations that the Project would be screened or viewed in the background distance zone, to limited areas of high impacts where high sensitivity viewers would have direct, unobstructed views of the Project in foreground distance zone. These impacts and associated changes to landscape character are consistent with Class IV objectives; therefore, consistent with applicable planning documents.

4.12.3 Wet-Cooled Alternative

Impacts to visual resources under the wet-cooled alternative would be similar to those described for the Proposed Action (dry-cooling alternative) with the following exception. Contrast would be reduced for those KOPs with views of the dry-cooling unit associated with the Proposed Action, which include KOPs 1 thru 6, 9, 10, and 15, because the wet-cooling unit is at least half the height, and therefore less visible to sensitive viewers. High impacts would remain for residences located along Sandy Lane and within Valley View Estates; however, impacts would be reduced for all other identified sensitive viewers identified in section 4.12.1.2.

The wet-cooling alternative does have a periodic visual element in vapor plume. The Proponent has completed a desktop study looking at other similar projects, such as the Beacon Solar Energy Project's Application for Certification filing with the California Energy Commission.

4.12.3.1 Vapor Plume Analysis

Visible plumes that occur during daylight hours have the potential for producing an impact on visual resources. The Project's cooling tower is a potential source of visible water vapor plumes;

therefore, an analysis was performed to estimate the potential size and frequency of visible plume formation during daylight hours. The Seasonal and Annual Cooling Tower Impacts (SACTI, Version 9/30/90) model was applied for this analysis. The following subsection presents a quantitative analysis of the vapor plumes emitted from Project facilities. The modeling results for the vapor plume are shown in Table 4-30.

Table 4-30 Cooling Tower Daytime Vapor Plume Analysis Results

Plume Length Case	Length (ft)	Daytime Frequency (hrs/yr)[1]
Maximum	1,371	7
90 Percentile	958	128
50 Percentile	92	173

[1]Yearly average based on 3 years of data

Source: ENSR/AECOM 2008

4.12.4 No Action Alternative

The No Action Alternative would result in no Project related impacts to visual resources because no Project facilities would be constructed on BLM land.

4.12.5 Mitigation

- Color mitigation – Surfaces of all ancillary facilities that are visible to the public, excluding the solar arrays, will be treated with paint colors that blend with the surrounding landscape ('desert' browns and tans).
- Landscape Screening – Landscape screening may be used to reduce visibility of the project in locations that high sensitivity viewers have unobstructed foreground views of the project. This condition pertains to the residences located along Sandy Lane and just east of Valley View Road.
- Restoration of disturbed areas – Any temporary areas that are used during the construction process and are to be restored (vegetation, topographic).
- Nighttime Lighting – The Proponent shall consider location and type of lighting to minimize potential light pollution to the greatest extent practicable. Measures may include (but not be limited to) light hoods/shields, directional lighting, minimum required brightness, setbacks from project perimeter, and 'as-needed' usage.

4.13 Hazardous Materials, Hazardous and Solid Waste

The anticipated direct and indirect impacts from construction, operation, and maintenance of the proposed Project are addressed in the following sections.

As discussed in Section 2.0, Project Description, the proposed Project will be designed to meet all applicable standards to reduce the risk of an accidental release, operated in a manner that

complies with safety standards and practices, and maintained so as to provide a safe workplace for Project personnel and to prevent significant adverse off-site impacts to the public at large. In addition, construction and operation will incorporate up-to-date industrial technology and design standards, and adhere to regulatory health and safety codes and guidelines, as well as established good industrial practices. Training, operating, inspection, and maintenance procedures that will minimize the risk and severity of potential upset conditions will be implemented.

4.13.1 Proposed Action

4.13.1.1 Construction Phase

Hazardous materials that are anticipated for use during construction include gasoline, diesel fuel, oil, lubricants, welding gases (e.g., acetylene, oxygen, and argon), and small quantities of solvents and paint. There are no feasible alternatives to these materials for operating construction vehicles and equipment, and conducting other construction activities such as welding. No acutely hazardous substances will be used or stored on-site during construction.

Diesel fuel is the hazardous material with the greatest potential for environmental consequences during the construction phase due to the volume of diesel fuel that will be used in construction equipment and the frequent refueling that will be required. To minimize the potential for a release, diesel fuel will not be stored on-site, except in equipment/vehicle fuel tanks. When refueling is required, a mobile fuel truck will be brought on-site to fuel each piece of equipment. The fueling will be supervised by both the fuel truck and equipment operators. Any fuel spilled will be promptly cleaned up, and any contaminated soil disposed of in accordance with the applicable state and federal requirements.

Small volumes of hazardous materials will be temporarily stored on-site inside fuel and lubrication service trucks. Paints and solvents will be stored in flammable material storage cabinets. Welding gases will be stored in steel cylinders and chained upright to a solid support structure, with the safety cover over the valve when not in use to prevent damage. Maintenance and service personnel will be trained in handling these materials. The most likely incidents involving these hazardous materials would be associated with minor spills or leaks. Impacts to site workers, the public, or the environment due to a minor spill or leak will be mitigated through the emergency response training program and procedures that will be implemented by Project construction contractors and employees, and by thoroughly cleaning up minor spills as soon as they occur.

Soil contaminated by a spill or leak will be disposed in accordance with applicable state and federal requirements. Minimal risk for fire and/or explosion exists with the use of these types of materials in the limited quantities expected. There is minimal potential for environmental impacts from incidents involving other hazardous materials during construction.

4.13.1.2 Operational and Maintenance Phase

Hazardous materials will be used and stored on-site during operations and maintenance. The hazardous material inventory, the general operational safety practices employed during hazardous material storage and use, the material-specific handling practices, and the toxicity of each hazardous material are discussed below.

4.13.1.3 Hazardous Material Inventory

A list of the large-quantity hazardous materials stored and used at the Project site along with the toxicity and storage practices for each material is provided in Table 4-31. The quantities identified in the table are per power block. For the purpose of this discussion, "large quantity" is defined as those chemicals stored or used in excess of 55 gallons for liquids, 500 pounds for solids, and 200 cubic feet for compressed gases. In addition to the chemicals listed in Table 4-31, small quantities (less than 55 gallons, 500 pounds, or 200 cubic feet) of janitorial supplies, office supplies, laboratory supplies, paint, degreasers, herbicides, pesticides, air conditioning fluids (chlorofluorocarbons), gasoline, hydraulic fluid, propane, and welding rods typical of those purchased from retail outlets may also be stored and used at the Project site. These materials will be stored in the maintenance warehouse or office building. Flammable materials (e.g., paints, solvents) will be stored in flammable material storage cabinet(s) with built-in containment sumps.

The remainder of the materials will be stored on shelves as appropriate. Due to the small quantities involved, the controlled environment, and the concrete floor of the warehouse, a spill can be cleaned up without significant environmental consequences.

4.13.1.4 General Operating Practices

Chemicals will be stored or processed in vessels or tanks specifically designed for their individual characteristics. All hazardous materials storage or process vessels will be designed in conformance with applicable ASME codes. Large quantity (bulk) liquid chemicals will be stored outdoors in ASTs manufactured of carbon steel or plastic, or in 400-gallon (nominal) capacity plastic totes, if applicable.

Spill containment structures (e.g., curbing, double-walled tanks or equivalent) to contain the chemicals in the event of a leak or spill will be constructed around each of the large-quantity hazardous chemical storage tanks or totes. Bulk storage tanks or totes will have secondary containment structures capable of holding the tank or tote volume plus an allowance for precipitation (25-year, 24-hour rain event). Concrete containment structures will be coated with a chemical resistant coating (e.g., epoxy) to ensure long-term integrity of the containment structure.

Small quantity chemicals will be stored in their original delivery containers in order to minimize risk of upset. Personnel working with chemicals will be trained in proper handling technique and in emergency response procedures for chemical spills or accidental releases. Appropriate PPE will be provided.

Table 4-31 Chemical Inventory and Estimated Usage Rates				
Hazardous Material and CAS No.[1]	**Relative Toxicity**[2] **and Hazard Class**	**Permissible Exposure Limit (PEL)**	**Storage Description; Capacity**	**Storage Practices and Special Handling Precautions**
LPG CAS No. 68476-85-7 Propane CAS No. 74-98-6	Low toxicity; Hazard class – Flammable gas	PEL: 1,000 parts per million	On-site storage, up to 36,000 gallons in storage tanks and piping; pressurized carbon steel tanks and pipelines for delivery to equipment	Tanks and piping will be designed to fire code and NFPA specifications and operated to industry standards
Sulfuric Acid, 29.5% solution CAS No. 7664-03-9	High toxicity; Hazard class – Corrosive, water reactive	PEL: 1 mg/m^3	Contained in batteries; 2,000 gallons total inventory	Isolated from incompatible chemicals and secondary containment
Carbon Dioxide CAS No. 124-38-9	Low toxicity; Hazard class – Non flammable gas	TLV: 5,000 ppm (9,000 mg/m^3) TWA	Carbon steel tank, 15 tons maximum on-site inventory	Carbon steel tank with crash posts
Therminol VP-1 Diphenyl ether (73.5%) CAS No. 101-84-8 Biphenyl (26.5%) CAS No. 92-52-4	Moderate toxicity, Hazard class – Irritant; Combustible Liquid (Class III-B)	Biphenyl = PEL: 0.2 ml/m^3 (8-hr TWA) TLV: 0.2 ml/m^3 (1 mg/m^3) (8-hr TWA) Diphenyl ether = TLV: 1 ml/m^3(8-hr TWA) TLV: 2 ml/m^3(15-min TWA) PEL: 1 ml/m^3 (7 mg/m^3) (15-min TWA)	1.5 MM gallons in system, no additional on-site storage.	Continuous monitoring of pressure in piping network; routine inspections (sight, sound, smell) by operations staff; isolation valves throughout piping network to minimize fluid loss in the event of a leak; prompt clean up and repair.
Lube Oil CAS No. 64742-65-0	Low toxicity Hazard class – NA	None established	Carbon steel tanks, 10,000 gallons in equipment and piping, additional maintenance inventory of up to 550 gallons in 55-gallon steel drums.	Secondary containment for tank and for maintenance inventory
Mineral Insulating Oil CAS No. 8042-47-5	Low toxicity Hazard class – NA	None established	Carbon steel transformers; total on-site inventory of 32,000 gallons	Used only in transformers, secondary containment for each transformer

Table 4-31 Chemical Inventory and Estimated Usage Rates

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class	Permissible Exposure Limit (PEL)	Storage Description; Capacity	Storage Practices and Special Handling Precautions
Diesel Fuel CAS No. 68476-34-6	Low toxicity; Hazard class – Combustible liquid	PEL: none established TLV: 100 mg/m^3	Carbon steel tank (300 gallons)	Stored only in fuel tank of emergency engine, secondary containment.
Nitrogen (Liquid) CAS No. 7727-37-9	Low toxicity; Hazard class – Non flammable gas	None established	Carbon steel tank; 80,000 pounds total inventory (2 full tanker trucks)	Carbon steel tanks with crash posts
Hydraulic fluid CAS No. 64741-89-5	Low to moderate toxicity; Hazard class – Class IIIB combustible liquid	TWA (oil mist): 5 mg/m^3 STEL: 10 mg/m^3	Carbon steel tanks and sumps; 500 gallons in equipment, maintenance inventory of 110 gallons in 55-gallon steel drums	Found only in equipment with a small maintenance inventory. Maintenance inventory stored within secondary containment.
Calcium Hypochlorite 100% CAS No. 7778-54-3	Moderate toxicity; Hazard Class – Corrosive, Irritant	PEL: None established Acute oral toxicity (LD50): 850 mg/kg (Rat)	Minimal on-site storage for water treatment; Not expected to exceed 50 lbs	Inventory management, isolated from incompatible chemicals
Oxygen Scavenger Reagent Acetic Acid 60% CAS No. 64-19-7 Iodine 20% CAS No. 7553-56-2 De-ionized water 20% CAS No. 7732-18-5	Moderate toxicity; Hazard Class – Corrosive, Irritant	 PEL: 10 ppm TWA PEL: 0.1 ppm N/A	Minimal on-site storage for water treatment; Not expected to exceed 50 lbs	Inventory management, isolated from incompatible chemicals
Welding gas Acetylene CAS No. 74-86-2	Moderate toxicity; Hazard class – Toxic	PEL: none established	Steel cylinders; 200-cubic-foot each, 800-cubic-foot total on-site	Inventory management, isolated from incompatible chemicals

Table 4-31 Chemical Inventory and Estimated Usage Rates

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class	Permissible Exposure Limit (PEL)	Storage Description; Capacity	Storage Practices and Special Handling Precautions
Welding gas Oxygen CAS No. 7782-44-7	Low toxieity; Hazard elass – Oxidizer	PEL: none established	Steel eylinders; 200-eubie-foot eaeh, 800-eubie-foot total on-site	Inventory management, isolated from ineompatible ehemieals
Welding gas Argon CAS No. 7440-37-1	Low toxieity; Hazard elass – Nonflammable gas	PEL: none established	Steel eylinders; 200-eubie-foot eaeh, 800-eubie-foot total on-site	Inventory management
Activated Carbon CAS No. 7440-44-0	Non-toxie (when unsaturated), low to moderate toxieity when saturated, depending on the adsorbed material; Hazard elass – eombustible solid	TWA (total particulate): 15 mg/m^3 TWA (respirable fraetion): 5 mg/m^3 TLV (graphite, all forms exeept graphite fibers): 2 mg/m^3 TWA	Used in two x 2,000-lb eanisters, 4,000 pounds total inventory, no additional storage	No excess inventory stored on-site, prompt disposal when spent
Herbieide Roundup® or equivalent CAS No. 38641-94-0	Low toxieity; Hazard elass – Irritant	Isoproplyamine salt of glyphosphate = no speeifie oeeupational exposure has been established	No on-site storage, brought on-site by lieensed eontraetor, used immediately	No exeess inventory stored on-site

[1] Low toxieity is used to deseribe materials with an NFPA Health rating of 0 or 1. Moderate toxieity is used deseribe materials with an NFPA rating of 2. High toxieity is used to deseribe materials with an NFPA rating of 3. Extreme toxieity is used to deseribe materials with an NFPA rating of 4.

[2] NA denotes materials that do not meet the eriteria for any hazard elass defined in the 1997 Uniform Fire Code.

Appropriate safety programs will be developed to address hazardous materials storage and use, emergency response procedures, employee training requirements, hazard recognition, fire safety, first aid/emergency medical procedures, hazardous materials release containment/control procedures, hazard communications training, PPE training, and release reporting requirements. These programs include a fire response program, a plant safety program, and facility standard operating procedures.

The facility will be subject to the SWPPP requirements administered by NDEP, Bureau of Water Pollution Control under the Stormwater General Permits for construction and industrial activities. The site-specific SWPPP will describe the management practices in place at the facility (e.g., regular inspections and maintenance of drainage facilities, employee training in proper hazardous material storage and handling procedures, and chemical spill response procedures) to prevent the release or discharge of hazardous materials to the waters of the State.

4.13.1.5 Chemical-Specific Operating Practices and Chemical Toxicity

Substance-specific operating practices and toxicity issues are described in the following paragraphs.

Fuel Gas Delivery

LPG will supply gas to boilers used for rapid daily plant startup and for HTF freeze protection. There will be two truck deliveries each week for both power plant units. A total of approximately 18,000 gallons of LPG will be stored at each power plant unit. LPG consists mainly of propane and butane. LPG is a flammable gas with a NFPA hazard rating of 4 with low toxicity. The fuel gas supplier will comply with all DOT regulations that apply to the transport of hazardous substances.

Compressed Gas Storage

Compressed gases stored and used at the facility may include gases typically used for maintenance activities, such as shop welding. These gases include acetylene, argon, and oxygen.

Acetylene is a flammable gas. It is highly reactive, however, it is not toxic. Oxygen is an oxidizer with low toxicity. Argon has low toxicity but may cause asphyxiation if released in a confined area. The potential impacts presented by the use of these gases at the Project are less than significant based on the following site-specific conditions:

- Compressed gases will be stored in standard compressed gas cylinders at the facility (typically 200 cubic feet per cylinder), and the total quantity will be kept to the minimum required for operation and maintenance.

- The compressed gases will be delivered and stored in DOT-approved safety cylinders, and secured to a solid support (such as a building or rack) to prevent tipping and physical damage.

- The compressed gases will be stored in an isolated storage area surrounded by crash posts to minimize potential for accidents or upset.
- Incompatible gases (e.g., flammable gases and oxidizers) will be stored in separate, isolated areas.
- Operators will be trained in the proper use of equipment and materials.

Water Treatment Chemicals

For the dry-cooled plant alternative, water treatment chemicals will be present in minimum quantities. Calcium hypochlorite and oxygen scavenger reagent are water treatment products that will be used in the boiler makeup water and auxiliary cooling tower application. Approximately 50 pounds of these products will be stored on-site and shipped to the site as required. Shipping and storing the products in the same container minimizes chemical transfers, and thus minimizes the chances of a spill. The toxicity of each mixture is moderate and they are classified as irritants and corrosives.

Under the wet-cooled plant alternative, water conditioning chemicals would be mixed with the makeup water to minimize corrosion and inhibit mineral scale formation. In addition to other water conditioning additives, sulfuric acid will be fed into the circulating water system for alkalinity reduction to control the tendency for mineral scaling in the circulating water. The sulfuric acid is supplied in an amount proportional to the circulating water makeup flow. All water conditioning additives will require separate storage tanks and metering equipment. For the sulfuric acid system, which is the chemical added in the largest quantities, the feed equipment would consist of a bulk storage tank and two acid metering pumps.

HTF

HTF is a synthetic hydrocarbon liquid mixture of diphenyl ether and biphenyl oxide. Dowtherm A, Solutia VP-1, and Therminol VP-1, are commercial products that have been used in concentrated solar trough plants to date. At present, the Proponent has indicated they intend to use Therminol VP-1 in the solar array and steam cycle of the proposed Project. The diphenyl/biphenyl oxide mixture is not classified as a hazardous material by the USDOT, nor is it listed under EPA CERCLA regulations. However, this material, when discarded, may be a hazardous waste as that term is defined by RCRA, 40 CFR 261.24, due to its toxicity characteristic. Biphenyl has a CERCLA Reportable Quantity of 100 lbs—the amount present in approximately 377 lbs (42 gallons) of Therminol. Therminol VP-1 is low odor, moderately toxic, a skin irritant, and a Class III-B combustible liquid.

Approximately 8,300 tons of HTF will be present in the heat transfer system, including the piping and necessary expansion tanks; no additional HTF will be stored on-site. The heat transfer system is a closed loop and the system pressure will be monitored continuously. The solar field will be regularly monitored by the operations staff using sight, sound, and smell to detect system leaks. Isolation valves will be installed throughout the solar field to minimize HTF loss in the event of a system leak. The isolation valves will be designed for automated operation triggered

by a pressure drop in the system, or manual operation if a leak is detected by other means. The Project is considering remote sensing equipment to allow for the detection of sudden large leaks. Leaks will be repaired promptly, and fluid spills will be cleaned up immediately.

Petroleum Products

Lube oil is stored in a 10,000-gallon carbon steel tank and in equipment and piping associated with each steam turbine. The turbine enclosure provides secondary containment sufficient to hold the full contents of the tank. The tank will be inspected daily to ensure that it is not leaking. Lube oil has low toxicity and does not meet the criteria for any hazard class defined by the Uniform Fire Code Diesel fuel will be used to fuel the emergency fire water pump engine. The fire water pump engine has a 300-gallon fuel supply in a carbon steel tank. The equipment skid provides secondary containment that can hold the full amount of the fuel. Diesel is a combustible liquid with low toxicity.

Insulating oil is used in the electrical transformers at the facility. The total quantity of insulating oil present at the facility will be 32,000 gallons. Each transformer is installed in a secondary containment structure that will contain 100 percent of the transformer capacity plus an allowance for precipitation.

Activated Carbon

The HTF expansion tank will be vented through a two-stage activated carbon system for the control of air emissions from the tank. Each stage of the system is comprised of a 2,000-lbs capacity carbon canister. The facility will not maintain an inventory of additional carbon. New activated carbon has low toxicity; however, once in use, the activated carbon will adsorb VOC and toxic air contaminants (TAC), including benzene, diphenyl ether, and biphenyl, and the toxicity will increase. Activated carbon is difficult to ignite, but will smolder once ignited.

The emissions control system will be monitored periodically (with a frequency specified in the air operating permit) to determine the saturation level of the carbon. When saturated with VOC and TAC, activated carbon is disposed of as a hazardous waste.

Herbicide

Herbicide will be used in the solar field to kill weeds in order to minimize the fire potential. The Applicants plan to contract the weed control program to an outside contractor. Accordingly, herbicide will not be stored on site but will instead be brought on-site on an as-needed basis. The Project will ensure that the contractor has the appropriate licenses and a robust safety program for its employees.

4.13.1.6 Hazardous Material Transportation

Hazardous materials will be delivered to the Project site via truck along US 95 and then into the gated and fenced site via the Project access road. US 95, is a major north-south transportation

route through Nevada and is currently used for the transport of hazardous materials; the Project will cause a small increase in hazardous material traffic along this route.

4.13.1.7 Off-site Consequence Analysis

The propane storage tanks and handling facilities will be equipped with continuous tank level monitors, temperature and pressure monitors and alarms, and excess flow and emergency island valves. Only trained technicians will conduct system maintenance and repairs.

Delivery

Propane is typically delivered in 5,000-gallon tank trucks. The tank trucks will be unloaded in an unloading area immediately adjacent to the propane tanks. The unloading area will be paved with concrete and curbed. During unloading operations, the driver performing the unloading operation will wear appropriate protective equipment, and will have a cut-off switch to stop the propane transfer in case of an emergency. The offloading operation will also be monitored by a control room operator via camera to provide backup support if there is a leak, hose break, or other accident during unloading.

With respect to the transport of propane to the Project site, DOT regulations require all truck tank trailers to meet strict requirements for collision and accident protection. Hazardous materials shipments will comply with applicable regulations in terms of route selection, operator training and qualifications, etc.

The tank trucks are designed to withstand violent accidents without breach of containment.

Storage

Storage of propane in an 18,000-gallon tank at each unit creates the potential for leak, spill, or rupture of the tank, releasing propane to the atmosphere. Propane is a flammable gas. Pressurized metallic storage tanks have a mean time to catastrophic failure of 0.0109 per million hours of service, or on average one failure every 10,500 years. Thus, failure of a pressurized propane tank during the lifetime of the facility is unlikely. Additionally, the storage tank will be protected by concrete curbing and steel columns to reduce the likelihood of accidental vehicle impacts.

4.13.1.8 Fire and Explosion Risks

The proposed Project will utilize two materials that pose potential risks of fire and explosion because of their flammability. These are propane and HTF, each of which is discussed below. Propane will be used as a fuel for the two boilers at the facility and poses a fire and/or explosion risk as a result of its flammability. Propane will be delivered to the site weekly by trueks owned and operated by a licensed vendor and will be stored on-site in an 18,000-gallon AST at each power block. The HTF at high temperatures can also present a fire hazard.

4.13.1.9 Seismic Risk

The possibility exists that an earthquake could cause the failure of a hazardous materials storage tank or HTF piping somewhere in the solar field. An earthquake could also cause the failure of the secondary containment system (berms and dikes), as well as electrically controlled valves and pumps.

The failure of all these preventive control measures might then result in a leak or discharge of hazardous materials. Due to the limited types and quantities of hazardous materials to be stored on-site and the sparsely inhabited surroundings, it is unlikely that hazardous materials could move off the site and impact residents and workers in the surrounding area.

The piping in the solar array contains the vast majority of the HTF and the solar field will not be constructed with secondary containment. However, it is very unlikely that an earthquake could cause the failure of the piping in the solar array, resulting in a loss of HTF that would have an off-site impact.

The piping in the solar array will be specifically constructed to allow movement due to thermal expansion – the steel piping in the mirrored trough sections of the array is connected to the HTF distribution headers with ball joints and the piping is not rigidly mounted to foundations or other structures. Furthermore, the solar array will be constructed with isolation valves to limit the HTF losses in the event of a piping failure. Due to these inherent design features, piping failures during seismic events are not likely and do not represent a significant risk to the public.

4.13.2 Wet-Cooled Alternative

The primary difference between a dry- and wet-cooled solar thermal plant is the additional amount of water-treatment chemicals needed to treat the larger volume of water required for a wet-cooled solar thermal plant. In general, the water treatment will require a sodium hydroxide (or similar caustic) for pH neutralization. Sodium hypochlorite is commonly used for cooling tower biological control. It can also be used as a disinfectant or bleaching agent. Sulfuric acid is a strong acid and is commonly used in different concentrations. Sulfuric acid could be needed for pH/alkalinity control of the circulating cooling tower water. In addition, a chemical for corrosion control of condensate piping, an oxygen scavenger, and an anti-scalant will be required. Ultimately, a wet-cooled plant requires more water; therefore, more waste and more chemicals for treatment. In general, the wet-cooled plant will require a treatment system that is 10 times as large as the dry-cooled system.

4.13.3 No Action Alternative

Under the No Action Alternative, the right-of-way would not be granted and the potential impacts from construction and operation of the proposed Project would not occur.

4.13.4 Mitigation

Mitigation measures for the use, storage, and disposal of hazardous materials is provided in Appendix A.

4.14 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are those that would occur after implementation of all committed and recommended mitigation. Unavoidable impacts do not include temporary or permanent impacts which would be mitigated. They also do not include impacts from speculative events such as hazardous waste spills which are not cleaned up promptly in accordance with accepted industry standards or regulatory requirements.

The Applicant has committed to implementing mitigation measures in their Project design to avoid or minimize potential impacts from construction and operation of the Proposed Action. Adverse impacts to resources analyzed were not identified after application of Applicant proposed environmental protection measures, or other mitigation was considered.

Therefore, if all Applicant committed environmental protection measures and additional mitigation measures are implemented, the Proposed Action is anticipated to have no unavoidable adverse impacts on the human and natural environment.

If additional mitigation requirements are identified through the Endangered Species Act Section 7 process, or other permitting processes, the Applicant would develop appropriate measures in consultation with the requesting agency and include these in their Project design. The USFWS may identify additional measures ("terms and conditions") to minimize the incidental take of listed species during the Section 7 consultation process; the Applicant would be required to implement these to be in compliance with the incidental take permit.

4.15 Irreversible and Irretrievable Commitment of Resources

This section describes the irreversible and irretrievable commitments of resources associated with construction and operation of the proposed Project. A commitment of resources is irreversible when primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the lost production or use of a resource that would cause the resource to be unavailable for use by future generations. Examples of these types of resources include nonrenewable resources, such as minerals and cultural resources, and renewable resources that would be unavailable for the use of future generations such as loss of production, harvest, or habitat.

Implementation of the proposed Project would result in the consumption of energy as it relates to the fuel needed for construction-related activities. Large amounts of gasoline and diesel petroleum products would be required for Project construction. Additionally, construction would require the manufacture of new materials, some of which would not be recyclable at the end of the lifetime of the proposed Project. The raw materials and energy required for the production of

these materials would also result in an irretrievable commitment of natural resources. Operation of the proposed Project would not cause a substantial increase in the consumption or use of non-renewable resources.

Implementation of the proposed Project would result in the loss of over 4,350 acres of vegetation and habitat. The loss of this habitat would be long-term. Following decommissioning, restoration would be conducted which would involve removal of structures, restoration of topography, and revegetation, all of which would work towards restoration of habitat. However, it is likely that restoration of native vegetation would be slow, and the success uncertain. Therefore, the loss of Desert Tortoise habitat is assumed to be permanent since restoration of vegetation for which they depend for foraging and other factors affecting the quality of the restored habitat are uncertain.

The majority of access required for construction and operation of the proposed Project would utilize existing public rights-of-way and access roads. The proposed Project would require re-routing the existing Amargosa Farm Road, but the re-routed road would re-connect with the existing road to the west of the facility.

Construction and operation of the proposed Project would require the use of a limited amount of hazardous materials such as fuel, lubricants, and cleaning solvents. All hazardous materials would be stored, handled, and used in accordance with BMPs and applicable, federal, state, and local regulations, including a construction-phase SWPPP and an operational phase SWPPP. Assuming appropriate implementation of these plans and practices as are recommended in the conditions of certification, potential degradation of the environment due to accidental spills associated with the proposed Project's use of hazardous materials would not occur.

Visual impacts would be significant and long-term considering the context and intensity of the Project effects in general. Intensity of potential effects involves the unique scenic characteristics of the local landscape as indicated by the rural character of the Project viewshed; concerns expressed by public commenters to date; a degree of uncertainty as to the level of discomfort or disability glare from parabolic mirrors; and concern over cumulative visual effects of renewable projects in the Amargosa Valley as a whole. The loss of visual quality would be long-term, enduring throughout the proposed 30-year lifespan of the facility. After the end of the Project's useful life, it would be decommissioned per BLM requirements; to be described in the Applicant's Decommissioning Plan.

As part of the decommissioning process, the facility would be removed to a depth of approximately 5 feet below grade, original contours restored, and the site revegetated. However, the removal of the existing facility would leave a very prominent visual impact over the entire site due to the strong color contrast created between graded, disturbed soil areas and undisturbed soil areas in the vicinity of the Project site. In addition, revegetation of areas in this desert region are difficult and generally of limited success. Thus, visual recovery from land disturbance of closure and decommissioning would likely occur only over a very long period of time.

4.16 Relationship Between Short-Term Uses and Long-Term Productivity of the Environment

NEPA requires consideration of the relationship between short-term uses and long-term productivity of the environment (40 CFR 1502.16). This section discusses the short-term use of the local environment and the maintenance and enhancement of long-term productivity as a result of construction of and operation of the proposed Project.

For the purposes of this discussion, "short-term" is defined as the period from the onset of construction activities through the initiation of project operation. "Long-term" is defined as the entire operational life of the solar energy plant, which is anticipated to be 30 years or more.

4.16.1 Short-Term Uses

The proposed short-term uses of the natural environment associated with the Proposed Action are the development of about 4,350 acres of land for the footprint of the proposed solar power plant and ancillary facilities; the consumptive use of approximately 600 afy of groundwater over a 39 month construction period; and the direct loss of vegetation and wildlife habitat. Short-term effects on the natural environment would result from land-clearing and construction activities. These would be related primarily to soil disturbance and air quality effects from site clearing and grading, and an increase in noise and traffic in the loeal area.

Short-term effects on social and economic resources would include an increase in revenue for some local businesses such as construction suppliers, hotels, restaurants, gas stations, and grocery stores.

4.16.2 Long-Term Uses

Approximately 4,350 acres of land would be permanently converted to utility uses, and flora and fauna within the Project footprint would be permanently removed. Longer term effects include the permanent loss of some visual quality from the introduction of the solar plant and ancillary facilities and the consumptive use of approximately 400 afy of groundwater over a 30 year period. Disturbances of previously undisturbed biological habitats could result in long-term reductions in the biological productivity of the area, as biological communities in arid regions tend to recover very slowly from disturbances.

4.17 Cumulative Impacts

4.17.1 Regulations and Guidance

The CEQ (40 CFR 1508.7) defines cumulative impacts as: "...the impact on the environment that results from the incremental impact of the action when added to other past, present, and

reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions."

These actions include current and projected area development, management activities, and authorizations on public land, land use trends, and applicable industrial/infrastructure components. Although the individual impacts of each separate project may not be significant, the additive effects of multiple projects could be. These past, present, and reasonably foreseeable future actions are analyzed to the extent that "they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have an additive and significant relationship to those effects."

4.17.2 Methodology for Assessing Cumulative Impacts

While there is not a universally accepted framework for cumulative effects analysis, the principles identified by the CEQ - *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997) have gained acceptance. These principles are based on the premise that resources, ecosystems, and the human community each can experience effects. For each of these, there are thresholds, or levels, of stress beyond which their desired conditions degrade.

Each affected resource, ecosystem, or human community must be analyzed in terms of its capacity to accommodate additional effects, based on its own time and space parameters. The most effective cumulative effects analysis focuses on what is needed to ensure long-term productivity or sustainability of the resource.

Information about past, present, and reasonably foreseeable future activities in the cumulative resource ROI were gathered from the BLM, USFWS, Nye County, and other agencies; adopted plans; environmental documents; and personal communications with public agencies and utility companies.

The approach to cumulative impacts of the proposed Project considers "past" projects to be those that have completed construction and are in operation. These projects are included in the environmental baseline, described in the Affected Environment portion of each resource area. Since the impact analysis in each resource area assesses impacts in terms of changes to existing environmental conditions, past projects are not separately addressed in the cumulative analysis. "Present" projects include those that are currently under construction or have been fully permitted such that they are likely to be part of the existing environment when the proposed Project has begun construction.

"Reasonably foreseeable" future projects are those for which a formal application has been filed. The majority of the projects that are specifically considered in the cumulative seenario for the proposed Project are other solar power projects on federal land managed by the BLM; the working definition of "reasonably foreseeable" projects on BLM land is based on whether or not a draft or final Plan of Development (POD) has been filed with the BLM by an applicant.

4.17.3 Geographic Context for Cumulative Analysis

Cumulative impacts occur in a geographic context; but the area over which cumulative effects potentially would be of concern varies for different environmental resource areas. For example, noise and vehicular traffic impacts usually are evaluated in localized terms, impacts on protective services and utilities require evaluation of larger service areas, and the scope of water resources and air quality impacts can involve an entire groundwater basin and/or be affected by topographic features (e.g., mountains). In short, the scope of cumulative impacts evaluations varies spatially, with considerable variability based on the nature of the environmental resource area being considered.

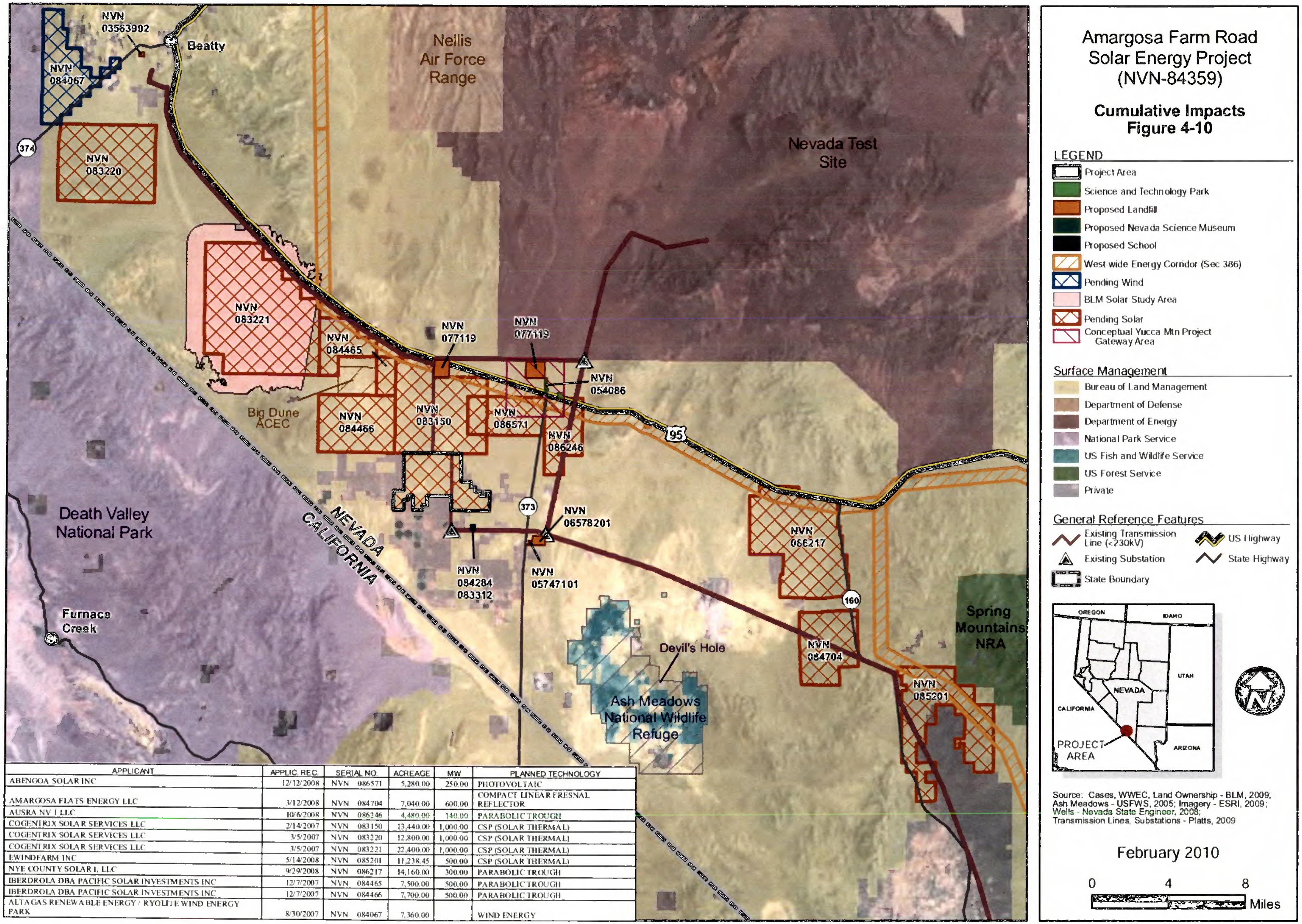
In a broad geographic context, the BLM has received more than 220 applications for utility-scale solar energy projects in California, Nevada, Arizona, New Mexico, Colorado, and Utah. These applications cover more than 2.3 million acres of land. There are also hundreds of applications for utility-scale wind and geothermal energy projects on BLM land in the western United States. Regional cumulative impacts could occur as a result of implementation of the proposed Project in conjunction with these solar, wind, or geothermal energy projects.

There are additional renewable energy projects proposed on private land in Nevada that are solely within the licensing jurisdiction of the Nevada Public Utilities Commission, depending on size. Also, anecdotal discussions with industry professionals suggest that a number of smaller solar photovoltaic (PV) projects are being considered on private land not under the jurisdiction of either the BLM or Nevada Public Utilities Commission.

The West-Wide Energy Corridor Programmatic EIS (PEIS) has delineated energy corridors running through the region, including proposed corridors that parallel US 95 north of the Project area. Electric transmission providers are evaluating various transmission line alternatives in the Amargosa Valley area; however, to date, no formal applications have been filed with either the BLM or the Public Utilities Commission of Nevada.

As part of their long-term planning, Valley Electric Association intends to upgrade its existing transmission lines that are located south of US 95 and west of NV 160 to accommodate future renewable energy development in their service territory. A new 230 kV transmission line adjacent to the proposed Project (along Powerline Road to Anvil Road) would be built. In addition, a new 230 kV transmission line would be built from the VEA substation (at the corner of Powerline Road to Anvil Road) to the existing Valley Switching Substation. The line would then parallel VEA's existing 138 kV transmission line to the proposed Johnny substation. Valley Electric is currently performing system impacts studies to determine other required upgrades to accommodate future load growth.

While the discussions in the various environmental resource areas often consider a broad regional perspective, the specific projects that are the primary focus of the cumulative analyses in this EIS are proposed projects identified between Beatty and Highway 160, basically the Amargosa Valley in Nevada. These proposed projects are shown on Figure 4-10.



APPLICANT	APPLIC REC.	SERIAL NO.	ACREAGE	MW	PLANNED TECHNOLOGY
ABENGOA SOLAR INC	12/12/2008	NVN 086571	5,280.00	250.00	PHOTOVOLTAIC
AMARGOSA FLATS ENERGY LLC	3/12/2008	NVN 084704	7,040.00	600.00	COMPACT LINEAR FRESNAL REFLECTOR
AUSRA NV I LLC	10/6/2008	NVN 086246	4,480.00	140.00	PARABOLIC TROUGH
COGENTRIX SOLAR SERVICES LLC	2/14/2007	NVN 083150	13,440.00	1,000.00	CSP (SOLAR THERMAL)
COGENTRIX SOLAR SERVICES LLC	3/5/2007	NVN 083220	12,800.00	1,000.00	CSP (SOLAR THERMAL)
COGENTRIX SOLAR SERVICES LLC	3/5/2007	NVN 083221	22,400.00	1,000.00	CSP (SOLAR THERMAL)
EWINDFARM INC	5/14/2008	NVN 085201	11,238.45	500.00	CSP (SOLAR THERMAL)
NYE COUNTY SOLAR I, LLC	9/29/2008	NVN 086217	14,160.00	300.00	PARABOLIC TROUGH
IBERDROLA DBA PACIFIC SOLAR INVESTMENTS INC	12/7/2007	NVN 084465	7,500.00	500.00	PARABOLIC TROUGH
IBERDROLA DBA PACIFIC SOLAR INVESTMENTS INC	12/7/2007	NVN 084466	7,700.00	500.00	PARABOLIC TROUGH
ALTAGAS RENEWABLE ENERGY / RYOLITE WIND ENERGY PARK	8/30/2007	NVN 084067	7,360.00		WIND ENERGY

In addition, cumulative impacts analysis must consider the variable of time as well as geography. The length of time for cumulative effects analysis varies according to the duration of impacts from the Proposed Action on the particular resource. The timeframe for the cumulative impact analysis begins at the time of Project construction (assume 2010) and extends sufficiently forward in time with consideration of past trends and activities on current and reasonably foreseeable future actions and trends that may affect the sustainability of the resource.

In some resource areas, the overlap in project construction schedules is particularly important because potential impacts that are enhanced by large overlapping construction work forces (e.g., impacts on traffic and socioeconomic conditions and infrastructure) could be considerable. However, these impacts are short-term and temporary because solar project operation-phase work forces are small compared to the construction phase.

There are uncertainties in any large-scale, complex, and costly industrial project as it moves from concept toward realization. However, the level of uncertainties with some of the proposed renewable energy projects in the desert Southwest is unusually great, as discussed in the section below.

4.17.4 Likelihood of Implementation of Cumulative Projects

Cumulative analysis under NEPA requires consideration of the likelihood that the proposed projects actually will occur. To quote the California Energy Staff in the Ivanpah Solar Electric Generation System Preliminary Staff Assessment:

"[While there is]...a very large number of applications to BLM, it is unlikely that all of these projects will be constructed for the following reasons:

- Not all developers will develop the detailed information necessary to meet BLM and Energy Commission standards. Most of the solar projeets with pending applications are proposing generation technologies that have not been implemented at large scales. As a result, preparing complete and detailed PODs is difficult, and completing the required NEPA and California Environmental Quality Act (CEQA) documents is especially time-consuming.

- After approval by the appropriate Lead Agency under CEQA [only applies to California projects] and NEPA, (generally the CEC and/or BLM), all permits must be obtained. The large size of these projects may result in permitting challenges related to endangered species mitigation requirements, and other issues.

- Also after project approval, construction financing must be obtained (if it has not been obtained earlier in the process). The availability of financing will be dependent on the status of competing projects, the laws and regulations related to renewable project investment, and the time required for obtaining permits."

Because it is impossible to predict which projeets will be developed, all of the identified projects must be considered. However, the fact that many of these projeets may not be eonstructed should be kept in mind for each of the cumulative analyses.

The proposed renewable energy projects in the Amargosa Valley on public or private land must successfully compete for Power Purchase Agreements with utility organizations who are working to meet their State-mandated Renewable Portfolio Standards. In addition, the projects in the Amargosa Valley are competing with many more renewable energy projects proposed throughout the Nevada desert to different BLM field offices (Las Vegas, Pahrump, and Battle Mountain).

4.17.5 Wind and Solar Energy Permitting

The U.S. Department of the Interior and, more specifically, the BLM is seeking opportunities to develop renewable energy resources on federal land. The BLM's policy is to encourage development of renewable energy projects on BLM land consistent with the National Energy Policy of 2001 and the Energy Policy Act of 2005. In furtherance of that goal, the BLM completed a Programmatic EIS assuring a common direction and policy for permitting wind facilities on public land, and is currently preparing a Solar Energy Programmatic EIS (PEIS).

The BLM and the DOE are currently preparing the Solar Energy Development PEIS. The PEIS will evaluate the potential for large-scale solar development on BLM-managed land in California, Arizona, Colorado, New Mexico, Nevada, and Utah. The PEIS will also evaluate the impacts of such development and develop standard mitigation measures for minimizing those impacts.

As described on the Project's website (http://www.solareis.anl.gov/), the BLM is considering whether to establish an agency-wide solar energy development program to supplement or replace existing policy, and to amend land use plans in the six-state study area to adopt the new program. The agency also expects to identify BLM-administered land that may be environmentally suitable for solar energy development and land that would be excluded from such development. The PEIS will consider whether designation of additional electricity transmission corridors on BLM-administered land is necessary to facilitate utility-scale solar energy development. Similarly, through this PEIS the DOE is considering a program of solar energy environmental policies and mitigation strategies as guidance to all DOE-funded solar projects.

The PEIS is not intended to eliminate the need for site-specific environmental review for individual utility-scale solar projects. Site-specific environmental reviews are expected to be tiered to the PEIS and to be simplified and improved by it. For each of 24 (geographic) solar energy study areas in the six states, the BLM intends to complete as much of the site-specific upfront environmental analysis as possible in order to determine whether the areas are appropriate for designation as solar energy zones.

Under the No Action EIS alternative, the DOE and the BLM would continue to evaluate solar energy projects on a case-by-case basis. Under the proposed action, the BLM and DOE will create a reasonably foreseeable development scenario to define the potential for future utility-scale solar energy development activities over a 20-year study period. The release of the Draft Solar Energy Development PEIS was originally scheduled for spring of 2009. However, BLM and DOE decided to postpone completion of the Draft PEIS so that the PEIS could be made consistent with a Department of the Interior policy goal of identification and prioritization of

specific locations best suited for large-scale solar energy production. The BLM has requested public comment on the 24 tracts of BLM-administered land identified for in-depth study for solar development.

As noted on the Project website in January 2010, the draft PEIS release schedule will be determined after the evaluation of comments from the current scoping period concerning the solar energy study areas (ending September 2009). The draft PEIS will not be available for several months after the close of the comment period at the earliest. For these reasons, the PEIS is not available to provide guidance for the preparation of cumulative impacts analyses in this EIS.

4.17.6 Cumulative Projects

As discussed above, the focus of the cumulative analyses in this EIS is to evaluate the potential impacts of the proposed Project combined with impacts of past, present, and reasonably foreseeable projects located within the Amargosa Valley in Nevada. This extent encompasses all relevant projects within the geographic area of responsibility of BLM's Pahrump Field Office. Relevant projects are those that have submitted draft or Final PODs to BLM. There are several solar developers who have submitted applications to the Pahrump BLM that are "second in line," meaning that they proposed development of sites for which applications have already been submitted. Other developers have submitted initial applications, but have not taken the step of submitting a draft or complete POD.

It should be noted that PODs are early project documents, often with quite limited and preliminary information in terms of project characteristics, site environmental conditions, and implementation schedules. As such, the BLM Pahrump Field Office has determined these documents should not be released for public review until a Notice of Intent to begin the NEPA process has been initiated for that project.

As of January 2010, only two other solar projects within the cumulative impact study area are in the public realm. A Notice of Intent to prepare an EIS for the Pacific Solar Investment project was published in the Federal Register on December 14, 2009. Scoping meetings for this Project were held January 19 - 21, 2010. The Notice of Intent for Preparation of an EIS for the Abengoa Solar project, known as the Lathrop Wells Solar Facility, is expected to be published in the Federal Register in March 2010. Although project specific information is not publically available for the other proposed renewable energy projects, basic information such as type of technology to be used, proposed size, and requested acreage are available on BLM's LR-2000 database. This data was used to evaluate the potential cumulative effects when considered with the proposed Project.

It is important to note that each of the cumulative proposed projects will undergo its own review process, and will be required to comply with applicable regulatory requirements and to mitigate impacts that are identified in the review process.

The cumulative projects considered in this EIS are shown on Figure 4-10 and are summarized in Table 4-32. Each of the projects was evaluated to determine if it is sufficiently defined

(reasonably foreseeable) to be: 1) relevant to potential impacts, 2) within the Project area of influence, and 3) of a magnitude that could potentially result in a cumulative impact.

Table 4-32 Summary of Cumulative Impact Projects

Project Name (Schedule)	Right-of-way (acres)	MW	Technology	Workforce	Water Usage
Valley Electric Association transmission line upgrades (2010-1012)	Upgrade existing electrical utility lines	N/A	Upgrade transmission line to 230kV	Unknown	Minimal during construction
Abengoa Solar Inc. Lathrop Wells Solar Facility NVN-086571 2011-2013	BLM Right-of-Way: 5,280 Facility: 4,200	250	Photovoltaic and dry-cooled solar trough (to be constructed in two phases)	Construction Peak – 1,500 Operations – 70 to 80	300- 500 afy
Amargosa Flats Energy NVN-084704 (Unknown) *	BLM Right-of-Way: 7,040 Facility: Unknown	600	Linear Fresnal Reflector	Unknown	Unknown
Ausra Nevada NVN-086246 (Unknown) *	BLM Right-of-Way: 4,480 Facility: Unknown	140	Parabolic Trough	Unknown	Unknown
Cogentrix Solar NVN-083150 (Unknown) *	BLM Right-of-Way: 13,440 Facility: Unknown	1,000	Solar Thermal (troughs)	Unknown	Unknown
Cogentrix Solar NVN-08322 (Unknown) *	BLM Right-of-Way: 12,800 Facility: (Unknown)	1,000	Solar Thermal (troughs)	Unknown	Unknown
Cogentrix Solar NVN-083221 (Unknown) *	BLM Right-of-Way: 22,400 Facility: (Unknown)	1,000	Solar Thermal (troughs)	Unknown	Unknown
EwindFarm, Inc. NVN-085201 (Unknown) *	BLM Right-of-Way: 11,238.45 Facility: (Unknown)	500	Solar Thermal (troughs)	Unknown	Unknown
Nye County Solar One NVN-085217 (Unknown) *	BLM Right-of-Way: 14,160 Facility: (Unknown)	300	Parabolic Trough	Unknown	Unknown
Pacific Solar Investment NVN-084465 (2011-2013)	BLM Right-of-Way: 7,500 Facility: 1,232	150	Photovoltaic (to be constructed in three phases (50 MW each phase)	Construction Peak – 200 Operations – Up to 5 for each phase	5 afy

Table 4-32 Summary of Cumulative Impact Projects					
Project Name (Schedule)	**Right-of-way (acres)**	**MW**	**Technology**	**Workforce**	**Water Usage**
Pacific Solar Investment NVN-084466 (Unknown) *	BLM Right-of-Way: 7,700 Facility: (Unknown)	500	Parabolic Trough	Unknown	Unknown
Altagas Renewable Energy / Ryolite Energy Park (Unknown) *	BLM Right-of-Way: 7,360 Facility: (Unknown)	N/A	Wind Energy	Unknown	Unknown
* Plans of Development not available for public review. Source: BLM and USFS 2009; Pacific Solar Investments 2009; Abengoa 2009					

4.17.7 Evaluation of Potential Cumulative Impacts

The following sections provide an analysis of potential cumulative impacts related to the Proposed Action on each resource when viewed in conjunction with other past, present, and reasonably foreseeable actions in the cumulative impact study area. This analysis considers the anticipated additive effect that the Proposed Action would have to cumulative impacts after BLM-approved mitigation measures are implemented.

Direct impacts from the Proposed Action include surface disturbance from Project construction. The cumulative impact study area for direct impacts includes the Project area within the Amargosa Desert Hydrographic Basin #230. The interrelated projects with potential direct cumulative effects include the construction and operation of Abengoa's and Cogentrix' proposed solar energy projects north of the Project site, and Pacific Solar Investment's proposed solar energy projects near Big Dune.

4.17.7.1 Air Quality

During construction, mitigation measures will be in effect to control and minimize equipment and fugitive dust emissions. Eaeh of the cumulative projects must undergo a separate environmental review process and address its own emissions and impacts. Cumulative impact potential depends on how many of the proposed projects actually are constructed, and whether projects near each other are constructed on overlapping schedules so that peak emissions and impacts coincide. In any case, potential adverse cumulative impacts would occur only during construction of the various projects. Virtually all of the cumulative projects are renewable energy facilities and thus would displace electricity generation that otherwise likely would oecur with higher-polluting fossil fuels.

During operation, the proposed Project is predicted to have minor impacts for all criteria pollutants. Due to the large geographic area these projects occupy and the minimal emissions, each of these projects is expected to have minor impacts individually and cumulatively with the proposed Project during operations.

4.17.7.2 Geological & Mineral Resources

Impacts to geological and mineral resources are generally localized and do not result in regionally cumulative impacts. Geological and mineral resources vary according to the geological formations that they occur within. Geological formations may also vary over short distances, effectively limiting the geographic range of the impacts to geological and mineral resources.

The impacts of the Proposed Action to geological hazards and mineral resources will be localized within the Project area. Therefore, the Proposed Action would not affect the immediate vicinity surrounding the Project area. Proper construction methods will reduce the potential for impacts to the Project resulting from geological hazards. Incremental impacts to area geology and mineral resources resulting from the construction, operation, and maintenance of the Proposed Action will not have cumulative impacts.

4.17.7.3 Soil Resources

The potential for cumulative impacts to soil resources as a result of the construction of this Project is considered moderate, based on the location of the proposed Project and the results of the soil resource study that was conducted for the Project. In the context of soil resources, moderate is defined as an impact that may affect the quantity or quality of a regionally significant resource, may affect the long-term productivity of the resource, may involve some irreversible or irretrievable damage to the resource, or creates an impact that can be mitigated on some level. The development of over 106,000 acres of proposed renewable energy projects would cumulatively impact soil resources in Amargosa Valley. The development of these projects would reduce the amount of soils available to plant, animal, and human communities in Amargosa Valley. However, it is anticipated that not all of these projects will be completed. Furthermore, future projects will be required to identify soil resources that would be affected by development, because the region consists mostly of federal land managed by the BLM. Any potential impacts to soil resources that are identified would be addressed.

4.17.7.4 Water Resources

The Fortymile Wash drainage flows through portions of the Project area. Two other solar energy projects are proposed immediately north of the proposed site: Cogentrix Solar Services, LLC (NVN-083150), and Abengoa Solar, Inc. (NVN 086571). Under the Proposed Action, the Proponent intends to protect the property from off-site flows by means of a continuous channel around the northern and western perimeter of the Project site. The channel will be designed to effectively intercept the 100-year storm event off-site runoff and convey the concentrated flow to the southwest corner of the property. The Proponent is coordinating with Nye County to pursue additional storm control alternatives.

An alternative for Regional Flood Control Facilities was presented to BLM and Nye County staff in 2009. The alternative would provide a regional off-site detention basin at the apex of the Fortymile Wash located north of US 95 and would effectively and considerably reduce existing condition peak storm flow downstream of US 95. Reducing off-site peak flows impacting the

site, and other proposed facilities, would allow for reduction in size of perimeter flood control facilities necessary for protection of the Project site. All properties downstream of the detention basin would benefit from this approach.

The interrelated projects and activities with potential effects on groundwater resources include the construction and operation of ten renewable energy projects, and continued groundwater pumping for agricultural, industrial, and domestic use in the Amargosa Valley. Cumulative indirect effects from groundwater pumping in the regional flow system may result in decline in local and regional groundwater levels, including the Ash Meadows area, and flows at downgradient locations.

The annual water requirement for each of the proposed renewable energy projects is unknown, as most developers within the cumulative impact ROI have not filed approved Plan of Developments for BLM review. For any project needing a stable water supply within the area subject to Order 1197, the developer would need to either lease or purchase water currently being pumped under an existing certified water right. Since the water user can only pump up to the authorized duty of the water right, there would be no net increase in groundwater pumping within the basin. However, since most wells in the Amargosa Valley are not metered, it is difficult to quantify the amount of water that may actually be pumped if all interrelated projects were to be approved. An indirect impact of conversion of agricultural water rights to industrial water rights would be a reduction of return flow (recharge) from irrigation.

4.17.7.5 Noise

Cumulative noise impacts from the operation of solar energy facilities are generally localized. The mechanical equipment associated with each of the cumulative projects is unlikely to result in combined noise impacts to a given known sensitive receptor due to the distance between each project. However, due to the increase in traffic volumes along highways and local roads from the construction and operations of multiple solar projects, an increase to the community ambient noise levels may occur.

Due to the remoteness of the general area and the size of the individual projects, instances where there would be cumulative noise impacts occurring at any given sensitive receptor location during construction activities would be infrequent and would only occur if multiple projects are constructed at the same time or when the construction activities occur along the adjacent project boundaries where known sensitive receptors are located.

4.17.7.6 Vegetation

Over time, natural and diverse plant communities of Mojave desert scrub are eliminated as native plant species are either destroyed or degraded as a result of increased energy development. Cumulative impacts to native species result when non-native invasive species are allowed to spread or be introduced in an area, eventually replacing naturally occurring communities. Native plants generally have a slow recovery rate, and generally cannot recover from severe disturbance. There are permanent impacts to vegetation when there is no evidence to indicate that pre-disturbance levels of biomass, cover, density, soils, and plant community structure could

be achieved within 5 years. Loss of native vegetation would affect habitat structure and ecological function of riparian communities. On a regional scale, the natural hydrological and ecological function of washes would be permanently altered as a result of cumulative use of the watershed.

The interrelated projects and activities with potential effects on groundwater resources include the construction and operation of ten renewable energy projects, and continued groundwater pumping for agricultural, industrial, and domestic use in the Amargosa Valley. Cumulative indirect effects from groundwater pumping in the regional flow system may result in decline in local and regional groundwater levels, including the Ash Meadows area, and the special status plant species which occur there, and flows at downgradient locations

Based on the location of the proposed Project and the results of the biological resource study that was conducted for the Project, the potential for cumulative impacts to vegetation as a result of the construction of this Project is moderate. In the context of biological resources, moderate is defined as an impact that may affect the quantity or quality of a regionally significant resource, may affect the long-term productivity of the environment, may involve some irreversible or irretrievable damage to the environment, or creates an impact that can be mitigated on some level. Creosote bush, the dominant species growing on the Project, grows abundantly in Mojave desert scrub; however, its importance is evident by its potential to support a large number of wildlife species, including the federally listed Desert Tortoise, its importance to local and regional biological processes and functions, and the uniqueness and age of creosote bush itself. Because the region consists mostly of federal land managed by the BLM, future projects will be required to identify vegetation and plant communities that would be affected, and any potential adverse effects to vegetation that are identified will be addressed.

4.17.7.7 Wildlife

The development of over 106,000 acres of proposed renewable energy projects would cumulatively impact wildlife and wildlife habitat occupying Mojave desert scrub. As discussed in section 4.17.4, it is anticipated that all of these projects will not be completed. The development of these projects would reduce the available habitat for wildlife (diverse group of reptiles, mammals, and birds), federally listed species (e.g., Mojave Desert Tortoise), and other special status species (e.g., Le Conte's Thrasher, Burrowing Owl). Cumulative impacts would contribute to the loss, fragmentation, and degradation of Mojave desert scrub, which would result in impacts to habitat connectivity, genetic integrity of wildlife populations, wildlife movement corridors, fragmentation of species populations, significant alteration of natural riparian habitat and function, and loss of occupied habitat for a variety of animals. Cumulative impacts would also encourage non-native invasive species, thereby eliminating or degrading natural plant communities upon which wildlife depend.

The Desert Tortoise inhabits the area in extremely low densities. The 2009 surveys detected four old burrows and no additional signs of recent inhabitation by tortoises. The quality of the habitat in the Amargosa Valley has been found to be of low quality due to lack of annuals and other suitable forage for Desert Tortoises. According to Nevada Natural Heritage Program data (2009), there are 10 known locations of Desert Tortoises found within the areas of the proposed projects.

The majority of the Desert Tortoise locations in the vicinity are to the north of Hwy 95 or south and east of Ash Meadows NWR.

The interrelated projects and activities with potential effects on groundwater resources include the construction and operation of ten renewable energy projects, and continued groundwater pumping for agricultural, industrial, and domestic use in the Amargosa Valley. Cumulative indirect effects from groundwater pumping in the regional flow system may result in decline in local and regional groundwater levels, including the Ash Meadows area, and the special status wildlife species which occur there, and flows at downgradient location

Based on the location of the proposed Project and the results of the biological resources study that was conducted, the potential for cumulative impacts to wildlife as a result of the construction of this Project is moderate. The elimination of vegetation (described above) or habitat directly affects local wildlife ecology and would contribute to changing trends in wildlife populations, movement and breeding of wildlife, and alter the interrelationships with other species occupying different ecosystems. Wildlife species occupying small, isolated patches of habitat are more susceptible to disturbance than species that are more widely distributed over the landscape. Because the region consists mostly of federal land managed by the BLM, future projects will be required to identify wildlife, including federally protected species and other sensitive species that would be affected by those projects. Any potential adverse effects to wildlife or wildlife habitat that are identified will be addressed.

4.17.7.8 Cultural Resources

Over time, cultural resources are subject to slow degradation as cultures change, and archaeological and historical sites weather and erode. Prior development of various types of projects has degraded and destroyed cultural resources as well. Indirect impacts on cultural resources can result from degrading the setting of a historic property and incidental damage to cultural sites as a result of increased public access to previously inaccessible areas.

Based on the location of the proposed Project and the results of the cultural resource study that was conducted, the potential for cumulative impacts to archaeological and historic sites as a result of the construction of this Project is considered low. The Project is located in an area with low site density which is currently accessible by the public and only one prehistoric site has been deemed significant. A potential increase in personnel living in the Amargosa Valley, from the proposed Project may have an effect on currently undiscovered historic properties in nearby areas during recreational pursuits. Because the region consists mostly of federal land managed by the BLM, any future projects will be required to identify any historic properties that would be affected, and any adverse effects to cultural resources identified would be mitigated.

4.17.7.9 Paleontological Resources

Impacts to paleontological resources are generally localized and do not result in regionally cumulative impacts. Paleontological resources vary according to the geological formations that contain them. Geological formations may also vary over short distances, effectively limiting the geographic range of impacts to paleontological resources.

The impacts of the Proposed Action to paleontological resources will be localized within the Project area. The suggested mitigation measures will ensure that the potential for adverse impacts to paleontological resources are minor. There is, however, the potential for future projects in the vicinity to disturb areas that may contain known or unknown paleontological resources. Future projects with potentially significant impacts to paleontological resources would be required to comply with federal and state regulations and ordinances protecting paleontological resources through implementation of similar mitigation measures as proposed here. Therefore, the potential construction impacts of the Proposed Action in combination with other projects in the area would not contribute to a cumulatively significant impact to paleontological resources.

4.17.7.10 Socioeconomic Resources

There is the potential for substantial renewable energy development not only in the Amargosa Valley, but throughout the desert Southwest. Cumulative impacts can occur if implementation of the proposed Project is considered with other local or regional projects. Cumulative impacts could occur as a result of regional development of the many proposed renewable energy development projects that have been or are expected to be under consideration by the BLM in the near future.

For this analysis, the geographic extent of cumulative impacts related to socioeconomics includes the Amargosa Valley, and larger cities within 2 hours of the Project area, including the Town of Pahrump, and Las Vegas and surrounding communities. This geographic extent is appropriate because local jurisdictions or districts provide socioeconomic factors, such as public services, and the labor force and housing market potentially impacted is expected to come primarily from within these areas.

Despite the potential for construction schedule overlaps with projects within the cumulative impact ROI, no adverse cumulative socioeconomic effects are anticipated from either the construction or operation of the proposed Project. As discussed in Chapter 4.9 – Socioeconomic Resources, an assumed maximum peak labor force of 1,300 workers during construction, and 180 full-time, permanent employees during operations, represents a small portion of the available regional labor force.

Implementation of the proposed renewable projects would create job stimulus within the local area that could increase population in the Amargosa Valley and other Nye County communities, including Beatty and Pahrump. However, since the proposed Project would not result in any project specific adverse socioeconomic impacts, it would not contribute to any potential local cumulative adverse socioeconomic impacts.

In addition, the long-term payment of taxes and fees and distribution of payroll dollars is expected to have a significant cumulative benefit to both Nye and Clark County by increasing the amount of public funds available to the counties for community projects. The cumulative benefits would be increased when combined with the revenues accrued as a result of current and future reasonably foreseeable projects.

4.17.7.11 Environmental Justice

Potential cumulative impacts associated with the Proposed Action would not have a disproportionate effect on low-income or minority populations. There are no special issues, such as housing, transportation, access, or resource use in the Project area that would affect the EJ population disproportionately.

4.17.7.12 Land Use, Recreation, Transportation, and Access

Over time, land use, transportation, access and recreation resources are impacted as land changes ownership, plans and facilities are developed, and demands for infrastructure increase or decrease. Prior activities including agriculture and mining in the Amargosa Valley have decreased available land, while simultaneously increasing access and transportation. Pending leases and rights-of-way on BLM land continuously impact land use in the area.

The potential for cumulative land use, recreation, and transportation impacts exists where there are multiple projects proposed in an area that could impact similar resources. Projects with large land use conversions similar to the proposed would collectively result in an adverse impact to the Valley's land use, recreation, and transportation resources by nature of the acreage they occupy and the increase in employee traffic.

Overall, some short-term and long-term, adverse and non-adverse cumulative impacts to transportation and recreation could occur in Amargosa Valley as a result of constructing numerous energy projects. Into the operation phase of the projects, the increased development impacts would decrease as improvements to infrastructure increase to meet the need. Impacts to land use, access and recreation therefore would be considered largely indirect and low.

Based on the available data on pending renewable energy applications with the BLM, approximately 106,000 acres of primarily federal land use would be converted to industrial use. The most important adverse impact related to this development would be the loss of access to land due to BLM disposal. By leasing/selling to developers, the loss of available lands for other uses (i.e., water and mineral resource development) would result.

Additive impacts on land use would also result from numerous existing and proposed industrial developments within the Amargosa Valley area, including agriculture, mining, solar power plants, and transmission lines. Increased energy development would drive the demand for the use of new and existing right-of-way corridors for transmission lines, pipelines, distribution lines, and roads to support the construction of these planned facilities.

The cumulative influx in laborers could create a moderate cumulative impact to the transportation network (US 95 and other local roads) in the area as they develop to meet the demands of increased development. Due to many construction workers opting to commute long distances to their work sites, temporary adverse impacts would result from the construction of multiple, large projects in the area.

This influx of workers would mean an increase in economic activity from workers spending in local businesses, and the projects themselves for construction materials and supplies, etc. The

increase in commercial activity to meet the demand of a new commuter population would potentially have indirect positive (economic) and adverse (increased traffic) impacts to the Project area.

An increase in various energy developments would potentially modify the character of the Amargosa Valley area. As development occurs, the very rural environment would become increasingly industrial. Large industrial developments that require many employees would spur other commercial and residential growth within the region, resulting in increased need for improved transportation corridors and other infrastructure.

Although no direct impacts would occur in the SMAs in the area, if populations increase as a result of industrial development, the use of designated and dispersed recreation areas within the Amargosa Valley area could also increase. Facilities would be stressed by the increased use, but could simultaneously benefit from the increased fee revenue. The quality of the recreational setting could be reduced due to the cumulative increase in development (through loss of wilderness aesthetic, etc. [see Visual impacts]).

Dispersed recreational opportunities on the formerly public land being disposed by the BLM for private land uses would be restricted.

4.17.7.13 Visual Resources

The development of over 106,000 acres of proposed solar project projects would result in increased visual cumulative impacts to the viewsheds from public roadways, recreation areas, and residential areas. Viewsheds of the Project vicinity are extensive given the topography of the Amargosa Valley, lack of vegetative screening, and dispersed nature of sensitive viewers.

Potential cumulative visual impacts would result from the construction, operation, and maintenance of the proposed Project in the context of current and proposed projects within the Amargosa Valley. The majority of proposed projects are solar and would have similar visual effects when compared to the proposed Project. Current and future projects would incrementally modify the setting in a similar manner, as compared to the proposed Project, which would result in an industrial landscape character. This change in landscape character in conjunction with potential viewer impacts would result in adverse cumulative impacts.

The proposed Project, along with the past, present, and reasonably foreseeable projects, could substantially alter the visual character of the areas within the Project vicinity. Many of the proposed projects would have the potential to create new visual impacts within the viewsheds that could be affected by the proposed Project from public roadways, recreation areas, and residential areas. The BLM will prepare a simulation, from KOP 2 – Lathrup Wells Rest Area (Figure 4-6 A,B), that illustrates visual cumulative impacts for inclusion in the FEIS.

When considered with the existing visual setting and future developments potentially modifying the visual character of the Amargosa Valley, the proposed Project would not significantly alter existing scenic quality or viewsheds associated with public roadways, recreation areas, and

residential areas and would not substantially add cumulative effects because the valley as whole would be modified by similar solar projects.

4.17.7.14 Hazardous Materials, Hazardous and Solid Waste

Facility design and hazardous materials handling programs developed and implemented for the Project would reduce the Project's potential impacts to the environment. The other identified cumulative projects would be required to comply independently with hazardous materials regulations, depending on their specific circumstances (e.g., nature and quantities of hazardous materials stored and used). Many of the cumulative projects (including the proposed Project), are separated by miles from any of the other projects so there is minimal risk of an accident at one project affecting another project. Solar projects also use less hazardous materials than do fossil fuel-fired power plants. In short, Project construction and operation activities would not cause or contribute substantially to significant cumulative impacts with respect to hazardous materials handling from either a local or regional perspective.

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CHAPTER 5 - CONSULTATION AND COORDINATION

This chapter describes the consultation and coordination activities the BLM has carried out with interested agencies, organizations, Tribes, and individuals while preparing the Draft EIS. The NEPA and CEQ regulations require the public's involvement in the decision-making process as well as allowing for full environmental disclosure. Guidance for implementing public involvement is outlined in Title 43 CFR, Part 1610.2.

During the early phases of the scoping process, the BLM determined that an EIS would be required to comply with the NEPA prior to taking action on Solar Millennium's right-of-way application. An EIS is the most detailed and complex of NEPA documents, and it includes requirements for significant public coordination and involvement throughout its preparation and review. The NEPA and CEQ require the BLM to identify any potential environmental impacts associated with the Proposed Action so the BLM can consider them when making its final decision.

5.1 Public Involvement Process

Public involvement in the EIS process includes the steps necessary to identify and address public concerns and needs. The public involvement process assists agencies in: (1) broadening the information base for decision-making, (2) informing the public about Proposed Actions, alternatives, and potential long-term impacts that could result from implementation of the Proposed Action or alternatives, and (3) ensuring that public needs are understood by the agencies. Public participation in the EIS process is required by the NEPA at four specific points: 1) issue scoping, 2) review of the Draft EIS, 3) review of the Final EIS, and 4) receipt of the Records of Decision.

5.1.1 Scoping

The public was provided two 30-day scoping periods to disclose potential issues and concerns associated with the Proposed Action. The first scoping period opened on July 13 and closed on August 12, 2009. As it was not possible to conduct public scoping meetings within this time period; a second notice was published in the Federal Register on September 17, 2009 (Volume 74, Number 179, Page 47820), reopening public scoping. This reopened scoping period was announced as ending on October 19, 2009. Four scoping meetings were held from August 17 through August 24, 2009 in Beatty, Amargosa Valley, Pahrump, and Las Vegas and one information meeting was held in Beatty on September 22, 2009. There was a total attendance among all meetings of 298 people. The BLM collected stakeholder comments at public meetings as well as comments sent via fax or mail. Information obtained by the agencies during public scoping was combined with issues identified by the BLM and forms the scope of this EIS.

5.1.2 Draft EIS Review

The 45-day comment period for public review of the Draft EIS will begin with the publication of the Notice of Availability in the Federal Register. The BLM will distribute press releases announcing the dates, locations, and times of the public meetings to local and regional print and broadcast media. The Draft EIS will be posted on the BLM Southern Nevada District Office website at: http://www.blm.gov/nv/st/en/fo/lvfo.html, and distributed to agencies and individual who have requested copies.

5.1.3 Final EIS

After the public comment period for the Draft EIS, a Final EIS will be prepared. This document will include descriptions of public comments and indicates how they were addressed in the Final EIS. A Notice of Availability will be published in the Federal Register announcing completion of the Final EIS. Per 40 CFR 1506.10 a 30-day waiting period is required between the publication of the Final EIS and issuance of the ROD.

5.2 Formal Consultation with Interested Agencies and Tribal Government

Federal and state agencies were contacted individually to gather input for the EIS. Other resource management agencies were consulted at the federal and state levels to identify common concerns related to the Proposed Action or Alternatives. Cooperating agencies on this EIS include the DOD, DOE, NPS, USACE, NDOW, and Nye County.

A BA is being prepared for the Proposed Action and will be submitted to the USFWS as required by Section 7 of the Endangered Species Act (1973). A species list was requested from the USFWS at the beginning of EIS development. The species list identified any plant and wildlife species listed as threatened, endangered or candidate species within the Project area. At the request of the USFWS, rare plant, sensitive wildlife species, and desert tortoise surveys have been conducted within the Project area. The BLM will continue to coordinate with the USFWS throughout the EIS process.

The BLM consulted with Native American Tribes that have ancestral ties to, or traditional culture use of, Project area lands. On June 17, 2009, the BLM mailed formal letters to the following tribal groups:

- Pahrump Paiute Tribe
- Las Vegas Paiute Tribe
- Chemehuevi Indian Tribe
- Colorado River Indian Tribes
- Timbisha Shoshone Tribe

The consultation letter, with attachments that explained each proposal in more detail, described the Proposed Action, in addition to five other renewable energy projects being proposed in the

Pahrump and Amargosa Valleys of Nye County, Nevada. The BLM requested (1) tribal input regarding any concerns about traditional cultural practices or other issues that might be affected by the Proposed Action, (2) information on how they would like to be involved in the planning process, and (3) names of other individuals that should be notified or consulted about the Project.

On August 5, 2009, the same tribes were e-mailed information about the Project's scoping meetings if they wanted to attend and make comments. A field trip with a representative of the Timbisha Shoshone into the Project area was conducted on September 17, 2009. At this time, no tribal verbal or written religious or cultural concerns have been expressed for this proposed Project area.

5.3 List of Agencies, Organizations, and Persons To Whom Copies of the EIS Were Sent

This section lists the agencies, officials, and other interested parties who requested copies of the Draft EIS. The BLM filed copies with the EPA, who publishes a Notice of Availability of the Draft EIS in the Federal Register. The BLM also distributed paper and electronic (on CD-ROM) copies to federal agencies, key state agencies, elected officials, local libraries, and other requesting parties. The BLM will provide copies to other interested organizations or individuals on request.

5.3.1 Federal Government

U.S. Army Corps of Engineers
U.S. Department of Defense
U.S. Department of Energy
U.S. Environmental Protection Agency – Region 9
U.S. Department of the Interior – Bureau of Reclamation
U.S. Department of the Interior – National Park Service
U.S. Department of the Interior – Office of Environmental Policy and Compliance
U.S. Department of the Interior – U.S. Fish and Wildlife Service

5.3.2 State Government

Nevada State Clearinghouse – The Nevada State Clearinghouse distribute copies of government documents to various State Offices for comment. This agencies include Nevada Department of Transportation, Nevada Department of Wildlife, and the Nevada Division of Water Resources among others.

5.3.3 Local Governments

Clark County
Nye County

Amargosa Planning Commission
City of Boulder City
City of Henderson
City of Las Vegas
City of North Las Vegas
Town of Beatty
Town of Laughlin
Town of Pahrump
Town of Searchlight

5.3.4 Tribal Governments

Pahrump Paiute Tribe
Las Vegas Paiute Tribe
Chemehuevi Indian Tribe
Colorado River Indian Tribes
Timbisha Shoshone Tribe

5.3.5 Other Organizations

Amargosa Conservancy
American Sand Association
BEC Environmental
Center for Biological Diversity
Central Telephone Company
Defenders of Wildlife
Desert Survivors
Desert Tortoise Council
Embarq
Howard R. Hughes College of Engineering
International Brotherhood of Electrical Workers, Local 357
Ironworkers, Local 433
Las Vegas Distance Riders
Las Vegas Review-Journal
Las Vegas Valley Water District
League of Women Voters
Los Angeles and Salt Lake Railroad Company
Motorcycle Racing Association of Nevada
National Park Conservation Association
Nevada Conservation League
Nevada Outdoor Recreation Association
Northwestern University, Environmental Policy and Cultural Program
NV Energy
Off-Road Business Association
Pahrump Valley Times

Plumbers and Pipefitters, Local 525
Public Employees for Environmental Responsibility
Red Rock Audubon Society
Sierra Club, Nevada Field Office
Sierra Club, Southern Nevada Group
Sierra Club, Toiyabe Chapter
Southern Nevada Building and Construction Trades Council
Southern Nevada Off-Road Enthusiasts
Southern Nevada Water Authority
Southwest Gas Company, Right-of-Way Department
Sustain-ability, Incorporated
University of Nevada – Las Vegas, School of Life Sciences
Valley Electric Association
Western Lands Project

5.3.6 Elected Government Officials

Jim Gibbons, State of Nevada Governor
Ed Goedhart, Nevada Assembly
Mike McGinness, Nevada Senate
Shelley Berkley, Nevada 1st District, U.S. House of Representatives
Dean Heller, Nevada 2nd District, U.S. House of Representatives
Dina Titus, Nevada 3rd District, U.S. House of Representatives
John Ensign, U.S. Senate
Harry M. Reid, U.S. Senate

5.3.7 Availability

Copies of the Amargosa Farm Road Solar Energy Project EIS are available for public inspection at the following public libraries and BLM offices.

Amargosa Valley Library
829 E. Farm Rd.
Amargosa Valley, NV 89020

Beatty Library
400 North Fourth St.
Beatty, NV 89003

Pahrump Community Library
701 East St.
Pahrump, NV 89048

BLM, Nevada State Office
1340 Financial Blvd.
Reno, NV 89502

BLM, Southern Nevada District Office
4701 N. Torrey Pines Dr.
Las Vegas, NV 89130

Denver Federal Center Library
West 6th Avenue and Kipling Street
Building 50
Lakewood, CO 80225

5.1 List of Preparers and Reviewers

5.1.1 BLM Core Interdisciplinary Team and Technical Specialty

5.1.1.1 BLM – Nevada State Office

- Ron Wenker – State Director
- Amy Leuders – Associate State Director
- JoLynn Worley – Public Affairs
- Erin Eastvedt, Renewable Energy Project Coordinator

5.1.1.2 BLM – Pahrump and Las Vegas Field Offices

- Mary Jo Rugwell – District Manager
- Patrick Putnam – Field Manager
- Gregory Helseth – Renewable Energy Project Manager
- Mark Chandler – Realty Specialist
- Gayle Marrs-Smith – Assistant Field Manager
- Hillerie Patton – Public Affairs Specialist
- Jayson Barangan – Natural Resource Specialist
- Michele Bilodeau – Environmental Coordinator
- Lisa Christianson – Environmental Protection Specialist
- Fred Edwards – Botanist
- Dave Fanning – Geologist
- Susan Farkas – Planning and Environmental Coordinator
- Krystal Johnson –Burro Specialist
- Amanda Hamlin – Administrative Professional
- Sarah Peterson – Hydrologist
- Meghan Magill – Hydrologist
- Marc Sanchez – Recreation Planner
- Kathleen Sprowl – Archaeologist
- Jeff Steinmetz – Lead Planning and Environmental Coordinator

5.1.2 EIS Contractor and Subcontractors

Name	Degree(s)	Professional Discipline/Expertise	Years of Experience
Karen Anderson	BA	Document Production, QA/QC	26
Emily Belts	BA	Land Use, Recreation, Transportation, SMA	4
Garlyn Bergdale	MLA, BS	Senior NEPA Reviewer	33
Glenn Darrington	PhD, MA, BA	Historic and Cultural Resources	22
Avril Fabian	MLA, BS	Land Use, Recreation, Transportation, Special Management Areas	5
Sandra Fairchild	BS, AA	NEPA Project Manager, Air Quality, Water Resources, Hazardous Materials and Solid Waste	26
Kristi Gardner		Document Production, QA/QC	12
Barbara Garrison	BS	Biological Resources	27
Rebecca Halbmaier	MSC, BA	Historic and Cultural Resources	8
Mathew Hamilton	MS, BS	Environmental Justice, Socioeconomic Resources	12
Chris Harris	B.S.	Visual Resources	5
Amy Jerome	MBA, BS	Senior NEPA Reviewer	12
Michael Kirby	PhD, MS, BS	Geologic Hazards and Mineral Resources, Soils, Paleontological Resources	20
N. Conrad Langley	MLA, BFA	Visual Resources	12
Diana Nickels	AA	Document Production/Graphics	21
Alison Pruett	MS, BS	Biological Resources	3
Michael Burrill – LFR	BA	Environmental Land Use Noise Compatibility	20
Kevin Fowler – LFR	BA	Environmental Noise Control	4
Guy Roemer – GeoTrans	BS, MS	Water Resources, Groundwater Modeling	13
Matt Sauter	MS, BA	Geologic Hazards and Mineral Resources, Soils	2
Marc Schwartz	MLA, BS	Visual Resources	10
Mickey Siegel	MCRP, BS	Management	30
E. Linwood Smith	PhD, MS, BA	Biological Resources	35
Paul Trenter	BSLA	Management	23

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CHAPTER 6 - REFERENCES

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CHAPTER 7 - GLOSSARY

ACEC: A BLM designation pertaining to areas where specific management attention is needed to protect and prevent irreparable damage to important historical, cultural, and scenic values, fish or wildlife resources, or other natural systems or processes, or to protect human life and safety from natural hazards

Acre-foot: A unit commonly used for measuring the volume of water; equal to the quantity of water required to cover one acre (43,560 square feet or 4,047 square meters) to a depth of 1 foot (0.30 meter) and equal to 43,560 cubic feet (1,234 cubic meters), or 325,851 gallons.

Action: In the context of the National Environmental Policy Act (NEPA), describes actions proposed to meet a specific purpose and need and that may have effects on the environment, which are potentially subject to Federal control and responsibility. Federal actions generally fall into the categories of adoption of official policy, formal plans, and programs; or approval of specific projects. For this document, the term action applies to a specific project.

Affected environment: Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action.

Air quality: A measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

Air Quality Standards: The level of pollutants prescribed by regulation that may not be exceeded during a specified time in a defined area.

Ambient: The surrounding natural conditions (or environment) in a given place and time.

Alluvium: A general term for clay, silt, sand, gravel, or similar consolidated material deposited during comparatively recent geologic time by a stream or other body of running water in the bed of the stream, river, or floodplain, or as a cone or fan at the base of a mountain slope.

Alternative: Any one of a number of options for a project.

Ambient: Of the environment surrounding a body, encompassing on all sides. Most commonly applied to air quality and noise.

American Indian tribe (or tribe): Any American Indian group in the conterminous United States that the Secretary of the Interior recognizes as possessing tribal status (listed periodically in the Federal Register).

Annual (ecology): A plant that completes its development in one year or one season and then dies.

Aquatic: Growing or living in or near the water.

Aquifer: A water-bearing rock unit (unconsolidated or bedrock) that will yield water in a usable quantity to a well or spring.

Archaeological site: A discrete location that provides physical evidence of past human use.

Archaeology: The scientific study of the life and culture of past, especially ancient, peoples, as by excavation of ancient cities, relics, artifacts, etc.

Area of Critical Environmental Concern (ACEC): A Bureau of Land Management (BLM) designation pertaining to areas where specific management attention is needed to protect and prevent irreparable damage to important historical, cultural, and scenic values, fish or wildlife resources, or other natural systems or processes, or to protect human life and safety from natural hazards.

Artifact: Any object showing human workmanship or modification, especially from a prehistoric or historic culture.

Assessment: The act of evaluating and interpreting data and information for a defined purpose.

A-Weighted Sound Levels: Decibels (referenced to 20 micro-Pascals) as measured with an A-weighting network of a standard sound level meter, abbreviated dB(A).

Backfill: The fill, often mine waste or rock, that replaces the void left from where a rock or ore has been removed. Also, the material used to fill in a trench in the groundbed (i.e., pipeline trench). The composition of the backfill varies based on the soil type being used and the component being covered.

Background (visual): That portion of the visual landscape lying from the outer limit of the middleground to infinity. Color and texture are subdued in this area, and visual sensitivity analysis here is primarily concerned with the two-dimensional shape of landforms against the sky.

Baseline: The existing conditions against which impacts of the proposed action and its alternatives can be compared.

Basin: A depressed area having no surface outlet (topographic basin); a physiographic feature or subsurface structure that is capable of collecting, storing, or discharging water by reason of its shape and the characteristics of its confining material (water); a depression in the earth's surface, the lowest part often filled by a lake or pond (lake basin); a part of a river or canal widened (drainage, river, stream basin).

Best management practices: A suite of techniques that guide, or may be applied to, management actions to aid in achieving desired outcomes and help to protect the environmental resources by avoiding or minimizing impacts of an action.

Big game: Large species of wildlife that are hunted (such as elk, deer, pronghorn antelope).

Biological assessment: Information prepared by, or under the direction of, a Federal agency to determine whether a proposed action is likely to (1) adversely affect listed species or designated critical habitat; (2) jeopardize the continued existence of species that are proposed for listing; or (3) adversely modify proposed critical habitat.

Biological opinion: A document that is the product of formal consultation, stating the opinion of the U.S. Fish and Wildlife Service on whether or not a Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

Butte: A steep hill standing alone in a plain.

Candidate species: A plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the U.S. Fish and Wildlife Service.

Clean Air Act of 1990: Federal legislation governing air pollution. The Clean Air Act established National Ambient Air Quality Standards for carbon monoxide, nitrogen oxide, ozone, particulate matter, sulfur dioxide, and lead. Prevention of Significant Deterioration classifications define the allowable increased levels of air quality deterioration above legally established levels and include the following:

> **Class I** – minimal additional deterioration in air quality (certain national parks and wilderness areas)
>
> **Class II** – moderate additional deterioration in air quality (most lands)
>
> **Class III** – greater deterioration for planned maximum growth (industrial areas)

Clean Water Act of 1987: National environmental law enforced by the U.S. Environmental Protection Agency that regulates water pollution.

Cooperating Agency: Assists the lead Federal agency in developing an environmental assessment or environmental impact statement. The Council on Environmental Quality regulations implementing NEPA define a cooperating agency as any agency that has jurisdiction by law or special expertise for proposals covered by NEPA (40 CFR 1501.6). Any Federal, state, or local government jurisdiction with such qualification may become a cooperating agency by agreement with the lead agency.

Council on Environmental Quality (CEQ): An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effort on environmental studies, and advises the President on environmental matters.

Criteria: Standards on which a judgment or decision can be based.

Cultural resources: Remains of human activity, occupation, or endeavor as reflected in districts, sites, buildings, objects, artifacts, ruins, works of art, architecture, and natural features important in human events.

Cumulative effect (or impact): The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions. Cumulative impacts are evaluated as part of the environmental impact statement (EIS), and may include consideration of additive or interactive effects regardless of what agency or person undertakes the other actions.

Daytime: The period from 7:00 a.m. to 10:00 p.m.

Decibel: A unit for expressing the relative intensity of sounds on a logarithmic scale from zero for the average least perceptible sound to about 130 for the average level at which sound causes pain to humans. For traffic and industrial noise measurements, the A-weighted decibel, a frequency-weighted noise unit, is widely used. The A-weighted decibel scale corresponds approximately to the frequency response of the human ear and thus correlates well with loudness.

Degradation: The wearing down or away, and general lowering or reducing, of the earth's surface by the processes of weathering and erosion.

Discharge: Outflow of surface water in a stream or canal (water). Discharge from an industrial facility that may contain pollutants harmful to fish or animals if it is released into nearby water bodies usually requires a permit issued by the U.S. Environmental Protection Agency and is monitored.

Distance zone: A visibility threshold distance where visual perception changes. They usually are defined as foreground, middleground, and baekground.

Diversion: A channel, embankment, or other manmade structure constructed to divert water from one area to another; the process of using these structures to move water.

Drainage: The natural or artificial removal of surface water and groundwater from a given area. Many agricultural soils need drainage to improve production or to manage water supplies.

Drawdown: The decrease in elevation of the water surface in a well, the local water table or the pressure head on an artesian well due to extraction of groundwater or decrease in recharge to the aquifer.

Easement: A right afforded a person, agency, or organization to make limited use of another's real property for access or other purposes.

Ecology: The relationship between living organisms and their environment.

Effect (or impact): A modification of the existing environment as it presently exists, caused by an action (such as construction or operation of facilities). An effect may be direct, indirect, or cumulative. The terms effect and impact are synonymous under the NEPA. A direct effect is caused by an action and occurs at the same time and same place (40 CFR 1508.8(a)). An indirect effect is caused by the action later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to

induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Emission: Effluent discharged into the atmosphere, usually specified by mass per unit time, and considered when analyzing air quality.

Endangered species: A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are rarely identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Endangered Species Act of 1973: Provides a means whereby the ecosystems upon which threatened and endangered species depend may be conserved and to provide a program for the conservation of such threatened and endangered species. The Endangered Species Act requires all Federal agencies to seek to conserve threatened and endangered species, use applicable authorities in furtherance of the purposes of the Endangered Species Act, and avoid jeopardizing the continued existence of any species that is listed or proposed for listing as threatened and endangered or destroying or adversely modifying its designated or proposed critical habitat. The U.S. Fish and Wildlife Service is responsible for administration of this act.

Energy conservation: A means of saving energy.

Environment: The surrounding conditions, influences, or forces that affect or modify an organism or an ecological community and ultimately determine its form and survival.

Environmental Impact Statement (EIS): A document prepared to analyze the impacts on the environment of a proposed action and released to the public for review and comment. An EIS must meet the requirements of NEPA, CEQ, and the directives of the agency responsible for the proposed action.

Environmental justice: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies (see Executive Order 12898).

Ephemeral wash or stream: A stream that flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice and has a channel bottom that is always above the local water table.

Erosion: The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as "gravitation creep."

Federal Register: Published by the Office of the Federal Register, National Archives and Records Administration, the Federal Register is the official daily publication for rules, proposed rules, and notices of Federal agencies and organizations, as well as executive orders and other presidential documents.

Floodplain: That portion of a river or stream valley, adjacent to a river channel, that is built of sediments and is inundated with water when the stream overflows its banks.

Foreground: The visible area from a viewpoint or use area out to a distanee of 0.5 mile. The ability to perceive detail in a landscape is greatest in this zone.

Fossil: Any remains, trace, or imprint of a plant or animal that has been preserved by natural process in the earth's crust since some past geologic time.

Geographic information system: A system of computer hardware, software, data, people and applications that capture, store, edit, analyze, and graphically display a potentially wide array of geospatial information.

Geology: The science that relates to the earth, the rocks of which it is composed, and the changes that the earth has undergone or is undergoing.

Geothermal resource: Heat found in rocks and fluids at various depths that can be extracted by drilling or pumping for use as an energy source. This heat may be residual heat, friction heat, or a result of radioactive decay.

Global warming: An increase in the average temperature of the earth's atmosphere and oceans. The term also is used to describe the theory that increasing temperatures are the result of a strengthening greenhouse effect caused primarily by manmade increases in carbon dioxide and other greenhouse gases.

Groundwater: Subsurface water that fills available openings in rock or soil materials to the extent that they are considered water saturated.

Habitat: A specific set of physical conditions in a geographic area(s) that surrounds a single species, group of species, or large community. In wildlife management, the major components of habitat are food, water, eover, and living space.

Hydrology: The study of the movement, distribution, and quality of water throughout the earth, addresses both the hydrologic cycle and water resources.

Impact (or effect): A modification of the existing environment as it presently exists, caused by an action (such as construction or operation of facilities). An impact may be direct, indirect, or cumulative. The terms effect and impact are synonymous under NEPA.

Indirect effect (or impact): Secondary effects that occur in locations other than the initial action or later in time, but that are caused by the proposed action.

Industrial area: A land use zoning term used to describe or designate areas in which heavy industry is concentrated or allowed.

Infrastructure: The facilities, services, and equipment needed for a community or facility to function, such as and including roads, sewers, water lines, and electric lines.

Intermittent: A river or stream that flows for a period of time, usually seasonally during rainy periods, and stops during dry periods. In arid regions, dry periods may be interrupted by occasional flash floods from brief but intense rain storms.

Invasive species: Describes a large number of nonnative plant species whose introduetion causes or is likely to cause economic or environmental harm or harm to human health.

Issue: Describes the relationship between actions (proposed, connected, cumulative, similar) and environmental (natural, cultural, and socioeconomic) resources. Issues may be questions, concerns, problems, or other relationships, including beneficial ones. Issues do not predict the degree or intensity of harm the action might cause, but simply alert the reader as to what the environmental problems might be. The NEPA document should address issues identified through interaction with agencies and/or the public, and/or through resource studies.

Labor force: All persons 16 years of age or over who are either employed or unemployed and actively looking for a job.

Land use plan: A plan or document developed by a government entity, which outlines specific functions, uses, or management-related activities of an area, and may be identified in combination when joint or seasonal uses occur and may include land used for support facilities that are an integral part of the use.

Landform: A term used to describe the many land surfaces that exist as a result of geologic activity and weathering (e.g., plateaus, mountains, plains, and valleys).

Landscape: An area composed of interacting ecosystems that are repeated because of geology, landform, soils, climate, biota, and human influences throughout the area. Landscapes are generally of a size, shape, and pattern, which are determined by interacting ecosystems.

Ldn: Day/Night Sound Level: A 24-hour average, where sound levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dB weighting, but no added weighting on the evening hours, abbreviated as DNL or L_{DN}.

Lease: An authorization or contraet by which one party (lessor) conveys the use of property to another (lessee) in return for rental payments. In cases of resource production, lessees pay royalties to the lessor in addition to rental payments.

L_{EQ}: The equivalent sound level, or the time-integrated continuous sound level, that represents the same sound energy as the varying sound levels, over a specified monitoring period.

Megawatt: A unit for measuring power equal to one million watts. The productive capacity of electrical generators is measured in megawatts.

Mesa: An isolated, nearly level land mass, formed on nearly horizontal rocks, standing above the surrounding country and bounded with steep sides.

Mineral resources: Any inorganic or organic substance occurring naturally in the earth that has a consistent and distinctive set of physical properties. Examples of mineral resources include coal, nickel, gold, silver, and copper.

Minimal (impact): Unless otherwise specified, "minimal" shall mean non-deleterious impacts that are measurable on the short term, but not significant (see definition herein).

Mitigation: The abatement or reduction of an impact on the environment by (1) avoiding a certain action or parts of an action, (2) employing certain construction measures to limit the degree of impact, (3) restoring an area to preconstruction conditions, (4) preserving or maintaining an area throughout the life of a project, (5) replacing or providing substitute resources to the environment, or (6) gathering data (e.g., archaeological or paleontological) prior to disturbance.

Multi-Use: Land use where a combination of use types can be found in close proximity together: commercial, residential, public, industrial, etc.

National Ambient Air Quality Standards: The allowable concentrations of air pollutants in the air specified by the Federal government. The air quality standards are divided into primary standards (based on the air quality criteria and allowing an adequate margin of safety and requisite to protect the public health) and secondary standards (based on the air quality criteria and allowing an adequate margin of safety and requisite to protect the public welfare) from any unknown or expected adverse effects of air pollutants.

National Environmental Policy Act of 1969: Our nation's basic charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy. In accordance with NEPA, all Federal agencies must prepare a written statement on the environmental impacts of a proposed action. The provisions to ensure that Federal agencies act according to the letter and spirit of NEPA are in the CEQ regulations for implementing NEPA (43 CFR 1500-1508).

National Register of Historic Places: A listing, maintained by the Secretary of the Interior, of districts, sites, buildings, structures, and objects worthy of preservation. To be eligible a property must normally be at least 50 years old, unless it has exceptional significance, and have national, State, or local significance in American history, architecture, archaeology, engineering, or culture; and possess integrity of location, design, setting, material, workmanship, feeling, and association; and (a) be associated with events that have made a significant contribution to the broad patterns of history, (b) be associated with the lives of persons significant in our past, or (c) embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values; or represent a significant and distinguishable entity whose components may lack individual distinction; or (d) have yielded, or may be likely to yield, information important to prehistory or history.

Negligible (impact): Unless otherwise specified, "negligible" shall mean impacts of such a small scale such as to be non-measurable.

Nighttime: Periods other than daytime (as defined above), including legal holidays.

Noise: Loud, unpleasant, unexpected, or undesired sound that disrupts or interferes with normal human a

Noise Emission: The industry standard format of sound power level, which is the total acoustic power radiated from a given sound source as relates to a reference power level of 10 picowatts. Sound power level differs from sound pressure level, which quantifies the fluctuations in air pressure caused by acoustic energy.

Noise Level Measurements: Unless otherwise indicated, the use of A-weighted and "slow" response of a noise monitoring instrument complying with at least Type 2 requirements as defined by the latest revision of American National Standard Institute (ANSI) S1.4 Specification for Sound Level Meters.

Nonattainment area: An air quality control region (or portion thereof) in which the U.S. Environmental Protection Agency has determined that ambient air concentrations exceed national ambient air quality standards for one or more criteria pollutants.

Noxious weed: Nonnative plant species that negatively impact crops, native plant communities, and/or management of natural or agricultural systems. Noxious weeds are officially designated by a number of states (including Nevada) and Federal agencies.

Particulates: Minute, separate particles, such as dust or other air pollutants.

Perennial stream: A stream or that part of a stream that flows continuously during all of the calendar year as a result of groundwater discharge or surface runoff.

Perennial yield: The amount of usable water from a groundwater aquifer that can be withdrawn economically and consumed each year for an indefinite period of time. It cannot exceed the natural recharge to that aquifer and ultimately is limited to maximum amount of discharge that can be used for beneficial use.

Pipeline: A continuous pipe conduit for transporting fluids such as natural gas and/or supplemental gaseous fuels, oil, or water from one point to another, usually from a point in or beyond the producing field or processing plant to another pipeline or to points of use.

Playa: The shallow central lake basin of a desert plain, in which water gathers after a rain and is evaporated.

Prime farmland: A special category of highly productive cropland that is recognized and described by the U.S. Department of Agriculture's Soil Conservation Service and receives special protection under the Surface Mining Law of 1977.

Project area: Footprint of the project.

Public land: Land or interest in land owned by the United States and administered through the Secretary of the Interior through the BLM without regard to how the United States acquired ownership, except lands on the Outer Continental Shelf, and land held in trust for the benefit of American Indians, Aleuts, and Eskimos.

Range: A large, open area of land over which livestock can wander and graze.

Raptor: A bird of prey.

Rare: A plant or animal restricted in distribution. May be locally abundant in a limited area or few in number over a wide area.

Recharge: Replenishment of a groundwater reservoir (aquifer) by the addition of water, through either natural or artificial means.

Reclamation: Restoration of land disturbed by natural or human activity (e.g., mining, pipeline construction) to original contour, use, or condition. Also describes the return of land to alternative uses that may, under certain circumstances, be different from those prior to disturbance.

Recontouring: Return a surface to or near to its original form through some type of action such as grading.

Record of Decision: A document separate from, but associated with, an EIS that publicly and officially discloses the responsible official's decision on a proposed action.

Region of Influence: Area which is impacted by activities related to the project. Varies by species and activity, however, for this project it has been defined as the hydrographic unit.

Reservation: Land set aside to achieve a particular land use or conservation objective. For the purposes of this document, reservation refers to those lands managed by an American Indian tribe under the U.S. Department of the Interior's Bureau of Indian Affairs. The reservation land is Federal territory held in trust for tribes. The American Indian tribes have limited national sovereignty.

Revegetation: The reestablishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance such as reseeding.

Reverse osmosis: A separation process that uses pressure to force a solvent through a membrane that retains the solute on one side and allows the pure solvent to pass to the other side. More formally, it is the process of forcing a solvent from a region of high solute concentration through a membrane to a region of low solute concentration by applying a pressure in excess of the osmotic pressure.

Revised Statute 2477: the right of way for the construction of highways across public lands not otherwise reserved for public purposes." That right-of-way is a legitimate property right (most often of the counties and states), and, consequently, carries with it a bundle of associated rights, including the right to maintain the roads and upgrade them under certain circumstances. Roads can be federally designated 'RS 2477'.

Right-of-way: Land authorized to be used or occupied for the construction, operation, maintenance, and termination of a project, such as a road or utility.

Riparian: Referring or relating to areas adjacent to water or influenced by free water associated with streams or rivers on geologic surfaces occupying the lowest position of a watershed. Pertaining to, living or situated on banks of rivers, streams, or other body or water. Normally used to refer to the plants of all types that grow along, around, or in wet areas.

Rural: Sparsely settled places away from the influence of large cities and towns. Such areas are distinct from more intensively settled urban and suburban areas, and also from unsettled lands such as outback or wilderness. People tend to live in villages, on farms, and in other isolated houses on large plots of land.

Scoping: The process open to the public early in the preparation of an EIS for determining the scope of issues related to a proposed action and identifying significant issues to be addressed in an EIS.

Screen: An initial assessment performed with few data and many assumptions to identify alternatives that should be evaluated more carefully.

Sediment: Solid fragmental material, either mineral or organic, that is transported or deposited by air, water, gravity, or ice.

Sedimentation: The result when soil or mineral is transported by moving water, wind, gravity, or glaciers and deposited in streams or other bodies of water, or on land. Also, letting solids settle out of wastewater by gravity during treatment.

Sensitive receptor: In terms of noise, people or animals that may hear a noise or be sensitive to increased noise levels within their range of hearing.

Sensitive Receptor Location: A location of regulatory compliance where particular sensitivities to noise exist, such as residential areas, institutions, hospitals, parks, or other environmentally sensitive areas.

Sound Pressure Level (SPL): The observable effect of acoustic energy radiation, quantifying the sound level as perceivable by the receiver. When Sound Pressure is used to describe a noise source, the distance between source and receiver must be known in order to yield useful information about the power rating of the source.

Sensitivity: The state of being readily affected by the actions of external influence.

Significant (impact): Unless otherwise specified, "significant" has been used in this document to describe any impact that would cause an impact that is irreversible and/or irretrievable without human intervention (i.e., mitigation/restoration)

Special Development Area: sets aside public or private areas of special interest that would be subject to a specific plan of development or a Development Agreement in accordance with Nye County Code Title 16.32. SDA is a mixed-use designation and a variety of land uses might be proposed for approval, such as the Yucca Mountain Project Gateway Area Concept Plan, and projects under review by the Bureau of Land Management, such as the Solar Energy Facilities. A property owner/developer must provide a specific plan of development for the subject property

and obtain recommendations from the Planning Committee and the Town Advisory Board prior to Nye County Commission approval.

Special status species: Wildlife and plant species either federally listed or proposed for listing as endangered or threatened; state-listed; or priority species of concern to Federal agencies or tribes.

Sound power Level (PWL): A specialized analytical metric used to fully quantify the acoustic energy emitted by a source which is considered a complete value without the accompanying information on the position of measurement relative to the source. It may be used to calculate the sound pressure level at any desired distance away from the source.

Surface water: All bodies of water on the surface of the earth and open to the atmosphere such as rivers, lakes, reservoirs, ponds, seas, and estuaries.

Surfactant: Any substance that when dissolved in water or an aqueous solution reduces its surface tension or the interfacial tension between it and another liquid.

Terrain: Used to describe the geophysiographic characteristics of land in terms of elevation, slope, and orientation.

Threatened or Endangered Species: Animal or plant species that are listed under the Federal Endangered Species Act of 1973, as amended (federally listed), or under similar state laws (state-listed).

Total dissolved solids: A term that describes the quantity of dissolved material in a sample of water.

Traditional cultural places: These named places (landscape features) comprise the cultural landscape that provides the context for evaluating specific traditional cultural properties.

Transition zone: The area between two discrete environmental areas, and thus containing elements of each. For example, the transition zone between an upland piñon forest and a lowland desert scrub environment.

Transmissivity: The rate at which water is transmitted through a unit width of the aquifer under a unit hydraulic gradient.

Tribe: Any Indian tribe, band, group, or community having a governing body recognized by the Secretary of Interior.

Undertaking: A project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license, or approval; and those subject to State or local regulation administered pursuant to a delegation or approval of a Federal agency.

Urban: An area where there is an increased density of human-created structures in comparison to the areas surrounding it. Urban areas are frequently referred to as cities or towns. The U.S.

Census Bureau defines an urbanized area as: "Core census block groups or blocks that have a population density of at least 1,000 people per square mile and (386 per square kilometer) and surrounding census blocks that have an overall density of at least 500 people per square mile (193 per square kilometer)."

Vegetation communities: Species of plants that commonly live together in the same region or ecotone.

Visibility: The distance to which an observer can distinguish objects from their background. The determinants of visibility include the characteristics of the target object (shape, size, color, pattern), the angle and intensity of sunlight, the observer's eyesight, and any screening present between the viewer and the object (i.e., vegetation, landform, even pollution such as regional haze).

Visual resource management classes: Categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes, each of which has an objective that prescribes the amount of change allowed in the characteristic landscape.

Waters of the United States: All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce including adjacent wetlands and tributaries to water of the United States; and all waters by which the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce.

Watershed: All land and water within the confines of a drainage divide.

Well field: Area containing one or more wells that produce usable amounts of water or oil.

Wetlands: Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Examples of wetlands include marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas.

Wilderness: An area formally designated by Congress as part of the National Wilderness Preservation System.

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CHAPTER 8 - INDEX

Appendix A

Proposed Avoidance, Minimization, and Mitigation Measures

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APPENDIX A – PROPOSED AVOIDANCE, MINIMIZATION AND MITIGATION MEASURES

A.1 Air Quality

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	**Operation and Maintenance**
AQ-1	Solar Millennium and/or the construction contractor will prepare an Air Quality Construction Mitigation Plan, for BLM's approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with air quality mitigation measures. Project activities would be in compliance with applicable federal, state, and local laws and regulations concerning prevention and control of air pollution during construction and operation.	X	X
AQ-2	Project personnel would be required to implement measures to minimize fugitive dust emissions from construction activities. To accomplish this, the following measures would be implemented. • All unpaved roads and disturbed areas in the Project footprint and linear construction sites will be watered as frequently as necessary to comply with the dust mitigation objectives. The frequency of watering can be reduced or eliminated during periods of precipitation. • No vehicle will exceed the approved speed limit within the construction site. • Visible speed limit signs will be posted at the construction site entrances. • All unpaved exits from the construction site will have gravel or an approved treatment to prevent trackout to public roadways. • All construction vehicles will enter the construction site through the approved treated entrance roadways, unless an alternative route has been submitted to and approved by the BLM. • Construction areas adjacent to any paved roadway will be provided with sandbags or other measures as specified in the Construction Storm Water Pollution Prevention Plan to prevent run-off to roadways. • All paved roads within the construction site will be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris. • All soil storage piles and disturbed areas that remain inactive for longer than 10 days will be covered or will be treated with an approved dust suppressant compound.	X	

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
	• All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions will be provided with a cover or the materials will be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard. • Wind erosion control techniques (such as windbreaks, water, approved chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will remain in place until the soil is stabilized or permanently covered with vegetation.		
AQ-3	The project owner will use gasoline powered light trucks for facility maintenance, except for mirror washing, welding rigs, or other specific activities which requires a larger vehicle.		X
AQ-4	The project owner will provide a site operations dust control plan that: • Describes the wind erosion control techniques such as windbreaks, water, and approved chemical dust suppressants that will be used on areas that could be disturbed by vehicles or wind; and • Identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only.		X

A.2 Geological Hazards and Mineral Resources

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
GEO-1	National Electrical Safety Code - Will provide guidance for mitigation of geological hazards by increasing the project's ability to withstand geological hazards such as earthquakes.	X	

A.3 Soils

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
SOIL-1	Onsite drainage system - The project will construct diversion channels, berms, and a drainage channel system to prevent onsite and offsite, downstream damage from water erosion. A site-specific, stormwater drainage plan will be prepared and adhered to during project construction and operation. The Plan of Development describes lined-drainage channels that	X	X

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
	will be installed within the solar fields. Areas between channels will be sloped toward the channels. Lined channels will reduce the potential for water erosion of natural soils that will remain within the solar fields.		
SOIL-2	Sediment Barriers - Man made sediment barriers such as hay bales or sand bags will be used to reduce soil/sediment loss from within the Project area.	X	
SOIL-3	Dust Reduction - Dust-control measures would be put in place to reduce the hazard of wind-blown dust within the Project Area. Active construction areas will be watered as an effective measure to reduce the escape of wind-blown dust from the site.	X	
SOIL-4	Coverage of Soil Stockpiles - Soil stockpiles that have been removed from the construction area will be covered to reduce runoff caused by precipitation and fugitive wind-blown dust.	X	

A.4 Water Resources

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
WTR-1	Prior to beginning any clearing, grading or excavation activities associated with construction of the project, the project owner will develop and implement an approved construction-phase SWPPP as required under the General Storm Water Construction Activity Permit, as well as implement any other project-specific mitigation measures required by other agencies (e.g. NDEP, Nye County, USACE).	X	
WTR-2	The project owner will obtain and comply with permits for construction of project specific water pipelines or septic system prior to construction of the plant.	X	
WTR-3	The project owner will apply for the appropriate water right permits for a change in place of use, manner of use and point of diversion (for water purchase option), as required, with the Nevada Division of Water Resources.	X	
WTR-4	Prior to commercial operation, the project owner, as required under the General Industrial Activity Storm Water Permit, will develop and implement an operations phase SWPPP.		X
WTR-5	The project owner will submit required monitoring or compliance reports to appropriate agencies as required.		X

A.5 Noise

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
NOISE-1	Personnel would be required to comply with applicable federal, state, and local laws and regulations concerning prevention and control of noise during projeet construction.	X	
NOISE-2	Equipment and trucks used for project construetion would utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible).	X	
NOISE-3	Stationary noise sources would be located as far from adjacent receptors as possible and would be muffled and enclosed within temporary sheds, incorporate insulation barriers or other measures to the extent feasible.	X	X

A.6 Biological Resources

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
Vegetation			
VEG-1	All construction vehicle movement outside the ROW would be restricted to pre-designated access, contractor access, or public roads.	X	X
VEG-2	The aerial limits of construction activities would be pre-determined, with activity restricted to and confined within those limits.	X	
VEG-3	Prior to construction, all supervisory construction personnel would be instructed on the protection of vegetation, including (1) federal and state laws regarding plants, including collection and removal; (2) the importance of this resource and the purpose and necessity of protecting them.	X	
VEG-4	Preconstruction surveys for plants designated as sensitive or of concern will be conducted in areas of known occurrence of habitat, including noxious weeds surveys as stipulated by the land-administering agency during the development of the Plan of Development (POD), once the facilities boundaries have been located and staked.	X	
VEG-5	Prior to construction, a Noxious Weed Management Plan will be developed in accordance with BLM standards. Included in the noxious weed plan will be stipulations regarding construction, restoration, and operation (e.g. use of weed-free materials, washing of equipment, etc.).	X	X

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
VEG-6	Pre-construction surveys conducted to identify the locations of plants protected by the State of Nevada (NRS 527.60-120) will be flagged and avoided until BLM authorizes a proper salvage protocol.	X	
VEG-7	Vegetation salvage and replanting will be implemented and completed as required by the BLM in accordance with their established guidelines. Adopting roadway signage that discourages off-road travel will help protect vegetation along the road margins.	X	
VEG-8	The area limits of project construction and survey activities would be predetermined based on the temporary and permanent disturbance areas noted on the final design engineering drawings to minimize environmental effects arising from the project, with activity restricted to and confined within those limits.	X	
Birds			
WL-1	Prior to the initiation of construction activities, all construction personnel will be instructed on the protection of migratory birds. To assist in this effort, the training will address the MBTA and all applicable state laws, field procedures, and prohibited activities.	X	
WL-2	Prior to any ground-disturbing construction activity, a qualified biologist will survey and inspect the potentially affected area(s) for nests or breeding birds. If a breeding pair is discovered within the construction footprint, BLM protocol for species protection would be implemented.	X	
WL-3	Qualified biologists will survey all areas to be disturbed during construction for Burrowing owl-nesting cavities prior to the nesting season and during construction if ground-disturbing activities occur between mid-march and August. Empty nest-site burrows will be collapsed within construction zone to mitigate direct impacts that may otherwise occur to the owl.	X	
WL-4	Burrowing owls and their burrows are protected at construction sites in accordance with USFWS-Las Vegas Office guidance. If owl-occupied burrows are located during the nesting or brooding season, burrows will be avoided following USFWS protocols until the young owls leave the nest or it is determined that the nesting attempt failed.	X	
WL-5	To minimize perching opportunities for raptors near habitats supporting sensitive prey species, structures incorporating a design to discourage raptor perching should be selected including Avian Power Line Interaction Committee (APLIC) guidelines for avoiding unintended injuries to birds.	X	

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
	Reptiles		
WL-6	Surveys for Desert Tortoise will occur prior to construction activities in accordance with applicable Federal and State regulations and laws.	X	
WL-7	Prior to the initiation of construction activities, all construction personnel will be instructed on the protection of the Desert Tortoise. The training will address: life history, listing status, applicable state and federal laws, field procedures, and prohibited activities.	X	
WL-8	All movement of construction vehicles outside of the right-of-way will be restricted to pre-designated access, contractor-acquired access, or public roads.	X	
WL-9	All construction sites and access roads shall be clearly marked or flagged at the outer limits prior to the onset of any surface-disturbing activity. All personnel shall be informed that their activities must be confined within the marked or flagged areas.	X	
WL-10	Any excavated holes (i.e., foundations) left open overnight will be covered, and/or tortoise-proof fencing will be installed to prevent the possibility of tortoises falling into them.	X	
WL-11	Construction sites and access roads shall be surveyed by qualified tortoise biologists no more than 15 days prior to the initiation of construction. Surveys shall provide 100 percent coverage of the construction area.	X	
WL-12	During periods of high tortoise activity (March through October) a tortoise biologist shall be present to monitor construction activities in areas not previously cleared or stabilized.	X	
WL-13	Dust control practices, specifically the use of water, will be monitored to ensure that pooling of water does not occur.	X	
WL-14	Personnel on the right-of-way, within Desert Tortoise habitat, will be required to check under their vehicles prior to moving them.	X	
WL-15	Pets will not be allowed on the transmission line right-of-way during construction.	X	
WL-16	All Desert Tortoise burrows located will be flagged or marked.	X	
WL-17	All Desert Tortoise burrows, and other species' burrows that may be used by Desert Tortoises, will be examined to determine the occupancy of each burrow by tortoises.	X	

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
WL-18	Any Desert Tortoise removed from construction sites shall be placed in an unoccupied burrow similar to the one in which it was found or in an artificial burrow, following the protocol approved by the BLM and USFWS and in compliance with NRS 503.597 and NAC 503.093.	X	
WL-19	Desert Tortoise eggs found within construction sites will be removed by qualified tortoise biologists, in accordance with BLM and USFWS protocols.	X	
WL-20	USFWS will be notified, within three days, of any tortoise death or injury caused by project activities. Notification will include the date, time, circumstances, and location.	X	
WL-21	Dead tortoises will be marked and left on-site.	X	
WL-22	Injured tortoises will be transported to a qualified veterinarian and the USFWS will determine their disposition.	X	
WL-23	Concurrent with the Desert Tortoise clearance surveys, a biologist will conduct a preconstruction survey for Gila Monsters in the project area.	X	
WL-24	NDOW's encounter protocols, *Gila Monster Status, Identification and Reporting Protocol for Observations* should be incorporated into the site plan of development (POD) and forwarded to the principal contractors and site managers for awareness during construction and operation.	X	X
General Wildlife and Wildlife Habitat			
WL-25	Clearing will be restricted to that area needed for construction.	X	
WL-26	Construction right-of-way will be limited to the minimum practicable width.	X	
WL-27	Littering is not allowed. Project personnel will not leave food or waste in the project area, and no biodegradable or non-biodegradable debris will remain in the right-of-way following completion of construction.	X	X
WL-28	No wildlife may be harmed except to protect life and limb.	X	X
WL-29	Project personnel are not allowed to bring pets to the project area in order to minimize harassment or killing of wildlife and to prevent the introduction of destructive animal diseases to native wildlife populations.	X	X
WL-30	Wildlife species may not be collected for pets or any other reason.	X	X

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
WL-31	Project supplies or equipment where wildlife could hide will be inspected prior to moving or working on them, to reduce the potential for injury to wildlife. Supplies and equipment that cannot be inspected or from which wildlife cannot escape or be removed, will be covered or otherwise made secure from wildlife intrusion or entrapment at the end of each work day.	X	
WL-32	All steep-walled trenches, construction holes, or excavations used during construction will be inspected twice daily (early morning and evening) to protect against wildlife entrapment.	X	
WL-33	An approved speed limit will be enforced on project right-of-way and access roads, unless otherwise posted, for all project personnel.	X	

A.7 Historic and Cultural Resources

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
CLT-1	Historic Properties Treatment Plan (HPTP) – Prior to construction, a HPTP will be designed and implemented to resolve any adverse effects to cultural resources. Mitigation measures would include data recovery methods in the case of this Project.	X	

A.8 Paleontological Resources

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
PALEO-1	Paleontological Resources Monitoring and Mitigation Plan - If scientifically significant paleontological resources (e.g., vertebrate fossils) are found at any time during construction, work shall be redirected to another area so that the scientific significance of the discovery may be assessed by the BLM. Solar Millennium, LLC, must immediately contact the BLM paleontological coordinator of the Pahrump Field Office and the BLM regional paleontologist so that they can assess the significance of the discovery and recommend mitigation measures, as necessary. If warranted, a paleontologist approved by the BLM will be retained to design and implement a monitoring program during project-related excavation (earth-moving) activities. Based on the new discovery, the paleontologist will review excavation plans and geotechnieal data to determine more speeifically where	X	

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
	paleontologically sensitive stratigraphic units may be disturbed by project-related excavation. Excavations would be monitored where these activities may potentially disturb previously undisturbed paleontologically sensitive sediment that may contain additional paleontological resources. This measure will be implemented by requiring paleontological monitoring in geological units designated as having a high potential to contain paleontological resources. The paleontological monitoring plan calls for the placement of one paleontological monitor at each construction location in all areas of high paleontological potential.		
PALEO-2	Construction Personnel Education - An orientation workshop and training will be prepared, reviewed by the BLM, and presented by a paleontologist approved by the BLM to explain paleontological mitigation guidelines and procedures to the contractor and construction workers.	X	
PALEO-3	Curation and Final Report - All fossils collected during construction will be prepared to a point where identification and permanent preservation is possible. Screen washing of fossiliferous sediment samples will be done in order to collect small or microscopic vertebrate fossils. A final report will be prepared by the paleontologist and distributed to the appropriate lead agencies.	X	
PALEO-4	Deposition in a Paleontological Repository - Fossils collected during construction will be curated into the collections of an accredited, Federally-approved, professional repository with long-term retrievable storage, such as the Nevada State Museum.	X	

A.9 Visual Resources

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
VIS-1	Color mitigation – Owner shall treat surfaces of all ancillary facilities, excluding the solar arrays, visible to the public with paint colors that blend with the surrounding landscape ('desert' browns and tans).	X	X
VIS-2	Landscape Screening – Landscape screening may be used to reduce visibility of the project in locations that high sensitivity viewers have unobstructed foreground views of the project. This condition pertains to the residences located along Sandy Lane and just east of Valley View Road.	X	X

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
VIS-3	Restoration of Disturbed Areas – Any temporary areas that are used during the construction process are to be restored (vegetation, topographic).	X	
VIS-4	Nighttime Lighting – Owner shall consider location and type of lighting to minimize any potential light pollution to the greatest extent practicable. Measures may include, but not be limited to, light hoods/shields, directional lighting, minimum required brightness, setbacks from project perimeter, and 'as-needed' usage.	X	X

A.10 Hazardous Materials and Hazardous and Solid Waste

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
HAZ-1	An onsite construction safety officer will be designated to implement health and safety guidelines and, if necessary, contact emergency response personnel and local hospitals.	X	
HAZ-2	Project construction contractors will be required to develop standard operating procedures for servicing and fueling construction equipment. These procedures will, at a minimum, include the following: • No smoking, open flames or welding will be allowed in fueling/service areas. • Servicing and fueling of vehicles and equipment will occur only in designated areas. These areas will be bermed, covered with concrete, or fashioned in some other manner to control potential spills. • Fueling, service and maintenance will be conducted only by authorized, trained personnel. • Refueling will be conducted only with approved pumps, hoses, and nozzles. • All disconnected hoses will be handled in a manner to prevent residual fuel and liquids from being released into the environment. • Drip pans will be placed under equipment to collect small drips and minimize potential spills during servicing. • Service trucks will be equipped with fire extinguishers, PPE, and spill containment equipment, such as absorbents. • Service trucks will not remain on the job site after fueling and service are complete.	X	
HAZ-3	Emergency telephone numbers will be available on site for the	X	X

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
	fire department, police, local hospitals, ambulance service(s), and environmental regulatory agencies.		
HAZ-4	Containers used to store hazardous materials will be properly labeled and kept in good condition.	X	X
HAZ-5	Hazardous materials storage will typically consist of storage of oil within equipment, ASTs, 55-gallon drums, or 5-gallon pails of lubricants and oils, and smaller containers of paints and solvents. These materials will be managed as described below to mitigate potential releases. • Hazardous materials will be stored in accordance with applicable regulations and codes, e.g., the Uniform Fire Code. • Trucks delivering hazardous materials will be parked adjacent to the usage area or storage area where the chemicals are to be stored to minimize potential unloading and transportation accidents. • Incompatible materials will be stored separately. • Containerized hazardous materials will be stored in original containers appropriately designed for the individual characteristics of the contained material. Containers will be labeled with contents in accordance with the OSHA Hazard Communication Standard (Title 29 CFR Part 1910.1200). • Hazardous materials will be stored within secondary containment structures. These structures will have capacity for the largest container plus an allowance for rainwater equivalent to a 24-hour, 25-year storm, if the area is outdoors. Alternatively, containerized hazardous materials may also be stored in commercially available hazardous materials storage sheds with built-in secondary containment. • Empty containers, especially portable totes and drums, will be emptied, drained, and returned to the supplier for reuse to the maximum extent possible or recycled off site. • Pollution prevention efforts such as replacement of hazardous materials with less hazardous materials, reduction of hazardous waste generation volumes, and recycling will be employed at the facility, as practical.	X	X
HAZ-6	The project owner will develop and implement spill response procedures. Personnel working with hazardous materials will be trained in proper handling and emergency response to chemical spills or accidental releases. Additionally, designated personnel will be trained as a facility hazardous materials response team. Safety equipment will be provided for use as required during chemical containment and cleanup activities, and will include safety showers and eyewash	X	X

Reference Number	Mitigation Measures	Mitigation Application Process	
		Construction	Operation and Maintenance
	stations. The facility will maintain on site one or more spill response kits. These kits will contain absorbents appropriate for the hazardous materials kept on site and each kit will be clearly designated for the type of spilled material for which it should be used.		
HAZ-7	The project owner will develop and implement several programs to address hazardous materials storage and security, emergency response procedures, employee training requirements, hazard recognition fire safety, first-aid/emergency medical procedures, hazardous materials release containment/control procedures, hazard communication training, PPE training, and release reporting requirements. These programs will include a Hazardous Material Business Plan, worker safety program, fire response program, plant health and safety program, and facility standard operating proeedures. The Plan will include procedures on hazardous materials handling, use, and storage; emergency response; spill prevention and control; training; record keeping; and reporting.	X	X

Appendix B

Groundwater Modeling Report

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Groundwater Modeling Services to Support the Amargosa Road Solar Power Project EIS Technical Memorandum

by
GeoTrans, Inc.

Introduction

The purpose of this report is to document the results of modeling simulations performed to evaluate the potential hydraulic effects of pumping 400 afy on nearby water resources, such as Devils Hole which is the only naturally occurring habitat for the Devils Hole Pupfish and discharge at Ash Meadows, for the EIS. Figure 1 shows the location of the Project area. Modeling was performed using the Death Valley Regional Flow System (DVRFS) Model (Belcher, 2004). The DVRFS model is the only existing model of the study area. This model was calibrated to both pre-pumping and pumping conditions. The Amargosa Basin is one of the areas covered by the model in which there has been significant pumping, and water-level changes measured in the area were used to guide calibration of the model. As with any model, improvements can always be made, and the predictive results should be evaluated accordingly.

Model Background

This model was developed by the U.S. Geological Survey (USGS) over a period of approximately eight years. The effort was funded primarily by the Department of Energy (DOE) through programs at the Nevada Test Site and at Yucca Mountain, with support and review by other Federal Agencies, including the National Park Service. The present model was developed in two phases. The first phase was the development of a three-dimensional flow model to simulate pre-development (steady-state) conditions, using geologic models developed separately by a contractor for the Underground Testing Area (UGTA) Project and by the USGS for the Yucca Mountain Project. The second phase of the DVRFS model development involved construction of a new geologic model, and development and calibration of the resulting new flow model to both pre-development and post-development conditions. The model produced from the second phase has commonly been called the "transient" model. GeoTrans was instrumental in the development of the UGTA model, and represented the UGTA Project during the development of the DVRFS model by the USGS. GeoTrans worked closely with the USGS, reviewing many of the products and modeling datasets, but did not perform any of the actual development effort.

In the following discussion, the term "model" will generally apply to the three-dimensional USGS DVRFS transient flow model.

Documentation of the model (DVRFS report) is available online (http://pubs.usgs.gov/sir/2004/5205/). In addition to the report itself, there are many supporting documents on geologic and hydrologic investigations performed to support

development of the model. Hydrologic investigations relevant to the Amargosa Desert include measurements of evapotranspiration (ET) at Ash Meadows, in Death Valley, and in Oasis Valley; estimation of ET at Franklin Lake playa and near Franklin Well (Amargosa River); construction of a dataset for pumping in the Amargosa Desert (and other areas); and measurement of groundwater recharge underneath the Amargosa River and irrigated fields in the Amargosa Farms area.

The model is developed using MODFLOW-2000, using a grid with a lateral spacing of 1,500 meters, and a variable vertical spacing. There are 16 model layers, with an interpretation of the water table used as a reference surface from which to base the elevation of the upper model layer. A large number of layers is needed to capture the geologic complexity incorporated into the geologic framework model, which is itself a simplification and interpretation of the actual geology. The model assumes that all layers are fully saturated, and that dewatering does not occur. Thus, transmissivities do not become smaller with drawdown, and the model is approximately mathematically linear. Because the Drain package is used to simulate springs, the model would not be strictly linear if drawdown is sufficient to cause water levels in a cell to decrease below the specified elevation of a drain. In addition, if drawdown is sufficient to cause appreciable decreases in the saturated thickness of the aquifer being pumped, the model will tend to underestimate the drawdown and overestimate the productivity of the aquifer.

The model was calibrated using a non-linear regression technique which optimizes modeling parameters to minimize the objective function, which was the sum of squared weighted residuals. A residual is defined as the difference between the observed (or estimated) value for a calibration target, and the corresponding simulated value. Hydraulic heads, water-level changes, discharge rates in spring areas, and lateral boundary fluxes were used as calibration targets. As the objective function represents the entire model, rather than concentrating on the Amargosa Farms and Ash Meadows areas, the agreement of simulated water-level change and measured change at Devils Hole is reasonable, but could be improved with additional work.

Following publication of the DVRFS report, a minor error was detected in the geologic model in the Oasis Valley area. The simulations reported here were performed with the updated model, which was downloaded from the above web site. Also, the modeling pumping and return flow datasets were updated in 2003 to include updated estimates of groundwater withdrawal and return flow from irrigation (Moreo and Justet, 2008). This updated dataset was also used in the simulations reported here.

Model Limitations

As stated earlier, the DVRFS model is the only existing groundwater flow model of the study area. Before evaluating predictions of drawdown at Devils Hole or change in discharge at Ash Meadows using the DVRFS model, the reader needs to be aware of the limitations of using a regional-scale groundwater model to evaluate potential water resource impacts at springs or other sites (e.g., Devils Hole) that are local in scale (feet). These limitations include 1) model grid size (1,500 m x 1,500 m), 2) calibration to

regional groundwater flow conditions, 3) estimates in historic pumping dataset and 4) simplification of geology. The DVRFS model report (p. 350) states "the use of the (DVRFS) model to address regional-scale issues or questions is the most appropriate use of the model." All the model results presented here are not accurate to the feet scale, but several meters. The DVRFS model gives you a qualitative sense of how water levels change over time at a given location, not quantitative.

Before conducting predictive modeling simulations, it is important to compare calculations of water-level change at Devils Hole with measured changes. Figure 2 shows the comparison through 2003, the end of the updated pumping and return flow dataset. Provisional water-level data after 1989 was received from National Park Service (NPS, 2006). Several features should be noted:

1. Both the measurement dataset and the simulated levels show declining water levels prior to the start of significant pumping in the Ash Meadows area. The simulated rate of decline is faster than the observed rate. The model is also slower to respond to changes in pumping rates.
2. The effects of pumping in Ash Meadows are readily apparent in both the measurements and simulated results beginning in approximately 1970, but the simulated change is greater than the measured change.
3. In the original 1998 model, during three periods beginning approximately in 1975, 1987, and 1998, there are simulated declines that do not oecur in the measured values. The model values do not recover as much as the measurements following cessation of nearby pumping. In the updated 2003 model, the simulated decline starting around 1975 still remains to a lesser degree, but the other two declines have been corrected. We suspect there is still an error in the historical pumping dataset prepared by the USGS for the 1975 period.
4. The effects of seasonal barometric changes, seasonal pumping, and earthquakes are not incorporated in the model.
5. Beginning in 1996, until 2003, the model simulates a decline in water levels.

In summary, the model overpredicts the drawdown eaused by historical local pumping by approximately 30%. Because of an apparent error in the pumping dataset, it is not definite whether the model would produce an effect from other, more distant pumping, but the later time results suggest that it would.

Model Simulations and Assumptions

After updating the USGS DVRFS model through 2003 with the revised pumping and return flow dataset, GeoTrans conducted several groundwater modeling scenarios using this updated model. Based on discussions with Project team members the following modeling scenarios were proposed and/or simulated as part of this Project:

1. Run existing DVRFS model an additional 200 years past the transient calibration period with 2003 pumping (i.e., No Action).

2. Same as Scenario 1 except add the proposed action of 400 afy from the existing three wells south of the site from 2010-2039 (i.e., Proposed Action).
3. After transient calibration period, incrementally decline Amargosa Farms pumping to stabilize water levels at Devils Hole.
4. After transient calibration period, turn off injection wells in Amargosa Farms.
5. After transient calibration period, reduce recharge in Amargosa Farms based on Stonestrom et al. 2003 and 2007 findings.

Scenarios 3 through 5 were added to examine the effects of reducing groundwater withdrawal and change in return flow and recharge from the Amargosa Farms area on Devils Hole water levels.

The following assumptions were made during the modeling scenario simulations:

1. No climatic effects – The current recharge dataset was used for the 200 year simulations. The effect of water rights users irrigating more or less due to climate than 2003 amounts was not estimated.
2. The Project groundwater withdrawal of 400 afy was added to the 2003 pumping dataset since the USGS estimate for 2003 was below the duty (1,328 afy) minus the Project pumping (400 afy) for the three wells. It is assumed that existing pumping from the three wells plus the 400 afy from the Project would not exceed the duty of 1,328 afy in the 200 year simulations.
3. Water infiltration from mirror washing was not accounted for because it is unknown what amount would ultimately end up as groundwater recharge.

Model Results

Figure 3 shows the simulated water-level elevation at the end of 2003 based on the revised pumping and return flow datasets. The water level contours indicate that the potentiometric surface of the valley fill indicate a broad and gently sloping gradient from the northeast toward the central axis of the valley and southwest toward the Funeral Mountains.

Figure 4 shows simulated drawdown contours at the end of 2003. This map represents the change in water level from pre-development (1912) to 2003. Within the Amargosa Basin, the most rapid water level declines occurred in the Amargosa Farms area, which is consistent with observed water level changes from other studies (Kilroy, 1991). Devils Hole is approximately 15 miles from the proposed pumping and the simulated drawdown at Devils Hole in 2003 is approximately 1.8 ft.

<u>Scenario 1 Results</u>
For scenario 1 (no action), 2003 pumping and return flow was repeated every year for the next 200 years to determine the change in water levels at Devils Hole. Figure 5 shows change in simulated water-level contours from 2003 to 2203. Drawdown is predicted to be more than 5 feet over a large area. However, the drawdown is predicted to decrease

rapidly in the Ash Meadows discharge area. The drawdown is buffered by the reduction in spring discharge that occurs with declines in water level.

Figure 6 shows that simulated water levels at Devils Hole decline over 13 feet after 200 years due to existing pumping. Note "time zero" is assumed to be the simulated water-level elevation on December 31, 2003 from the model, not pre-development conditions.

Scenario 2 Results

For the proposed action, the 400 afy of groundwater withdrawal was divided between the three Project wells. Pumping from these three wells is assumed to start in 2010 and concludes in 2039 since the Project life is 30 years. Table 1 shows the proportion of pumping between the three wells. All wells were pumped from Layer 1 in the model since Layer 1 was thicker than the depth of any of the three wells.

Table 1. Proposed Groundwater Withdrawal from Project Wells

App. No.	Easting (m)	Northing (m)	Duty (afy)	Proposed w/d (afy)	Model Row	Model Column	Model Layer
15702	542358.48	4045750.11	175	53	116	71	1
15893	542362.42	4044948.68	603	183	116	71	1
43873	542762.50	4044550.36	545.38	164	117	71	1

Figure 7 shows the simulated water-level decline from the existing pumping and the Project pumping from 2003 to 2203. An additional 400 afy of pumping reduces simulated water levels at Devils Hole by less than 0.05 ft or 0.6 in after 200 years. Recall this reduction in water levels is approximately 30% higher due to the model overpredicting water level declines at Devils Hole historically (See Figure 2). Also, the DVRFS model calibration is not accurate to 0.05 ft but meters and is not designed to exactly measure drawdown at a spring location several miles away, such as Devils Hole because of its 1) grid size (1,500 m x 1,500 m), 2) calibration to regional groundwater conditions, 3) estimates in historic pumping dataset and 4) simplification of geology. Thus, the regional model has a limited capability to accurately evaluate incremental changes in pumping tens of miles away on Devils Hole, but it is the only groundwater flow model available.

Recently, groundwater withdrawal from the three Project wells (e.g., from 2005 to 2007) has been reported as 1,328 afy, the full duty. The Project withdrawal of 400 afy should result in a minimal effect on Devils Hole water levels in addition to the existing pumping in the basin. The water rights owners will use 928 afy for agriculture and 400 afy will be used for the Project. There will be a small difference between the shift from an agricultural to industrial beneficial use; however, it is impossible to quantify how much recharge will be derived from mirror washing. Studies have been performed on irrigation return flow adjacent to the property (Stonestrom et al. 2003 and 2007), but give a range of values for recharge from two different methods: 1) 0.1 to 0.5 m/yr (4 to 20 in/yr) from

vertical profiles of water potential and environmental tracers and 2) 9-22% of infiltrated irrigation from chloride mass-balance estimates. The reason the model does not show zero water-level change at Devils Hole due to Project pumping is due to the USGS estimate for 2003 groundwater withdrawal from the three wells being lower than 928 afy.

Scenario 3 Results

Figure 8 shows the effect on simulated water-level change at Devils Hole of incrementally (i.e., 10%) reducing groundwater withdrawal within the Amargosa Basin. In order to stabilize water levels at Devils Hole, pumping in the basin would have to be reduced between 80 and 90% from 2003 levels. Thus, pumping an additional 400 afy would have a negligible effect on the stabilization and/or reeovery of water-level changes at Devils Hole. Even if all pumping in Amargosa Basin ceased after 2003, recovery of water levels at Devils Hole would not start occurring for approximately 37 years and take longer than 88 years to fully recover.

Scenario 4 and 5 Results

Figure 9 shows the effect of turning off return flow to the valley-fill deposits from irrigation in the model. Simulated water-level change at Devils Hole would increase approximately an additional 2.3 feet or 18% due to shutting off return flow. Scenario 5, which is reducing recharge to the valley-fill deposits based on the 2003 and 2007 Stonestrom et al. (Stonestrom) studies, was not simulated because the result would fall between the two curves on Figure 9. As discussed earlier, Stonestrom measured the amount of infiltration beneath an irrigated field adjacent to the Project site. The amount of infiltration was measured between 0.1 and 0.5 m/yr. Changing the recharge in the model to any amount in this range would produce a water-level change curve that would fall between the two curves on Figure 9.

Ash Meadows Discharge

Discharge occurs at Ash Meadows because of the presence of the water-bearing carbonate aquifer exposed in the low-lying hills northeast of the discharge area, and the presence of an impediment to flow that causes water levels to be elevated to the land surface. Dudley and Larson (1976) indicate that groundwater flows southwestward toward Ash Meadows in the carbonate aquifer under confined conditions. Water is forced upward "along faults that segment the hills east of Ash Meadows. This produces a mound of unconfined water which discharges laterally into shallower local aquifers."

The USGS code ZONEBUDGET was used to evaluate the changes in water movement for the Amargosa Basin including discharge at Ash Meadows. Under the present-day pumping rates, the model predicts that only minor changes to the discharge rate at Ash Meadows would have occurred by 2003, the end of the model calibration period (Figure 10). When the present-day pumping is continued into the future, the model predicts that impacts to the discharge will occur. In 2203, the discharge is predicted to be reduced from approximately 18,095 acre feet per year (afy) to 15,607 afy. When the Project

pumping is added, the discharge rate in 2203 is predicted to be reduced to only 15,600 afy or a negligible difference of 7 afy or 0.05%.

Results of other hydrologic studies

It would be reasonable to ask whether the historical water-level changes calculated by the model are consistent with the conclusions of other investigators. Two recent investigations evaluated Devils Hole water levels and concluded that pumping, rather than climatic changes, was the cause of historic declines in water levels. The first (Fenelon and Moreo, 2002) evaluated water level changes in wells over a large area that included the Amargosa Desert and Ash Meadows. They considered pumping, changes in recharge rates, earthquakes, and barometric pressure changes as factors that would cause water levels to change. Figure 17 of their report shows the correlation between pumping in the Amargosa Farms area and downward water-level trends over the period of 1992 to 2000 in the Amargosa Farms area. In the Devils Hole area, they consider whether pumping in the Amargosa Farms area could impact Devils Hole water levels, but do not conclude that it has. They also conclude that pumping from well Army 1 near Mercury, NV (see Figure 1) has not impacted Devils Hole water levels based on the lack of response to a reduction in production from Army 1 that began in 1994. They also note that Devils Hole may still be recovering from the pumping in Ash Meadows. The slow recovery to local pumping would suggest that responses to reduction of pumping much further away would be difficult to measure, especially with other stresses changing.

Bedinger and Harrill (2006) evaluated changes in Devils Hole water levels using a regression procedure. They constructed simple Theis models of drawdown caused by pumping at Ash Meadows, the Amargosa Farm area, and Army 1. Temporal changes in pumping rates at these three areas were calculated through superposition. A regression procedure, with water level at Devils Hole as the dependent variable, was used to calculate the relative effects of pumping in these three areas. They determined in a preliminary analysis that consideration of climate variability explained very little of the variability in Devils Hole water levels. The Theis solutions were calculated using hydrologic parameters that might be considered appropriate for the aquifers, but they could not successfully determine these values during "model calibration" because of parameter correlations. They determined that the pumping at Ash Meadows, the Amargosa Desert (Amargosa Farms area) and Army 1 explained 98% of the variability in the annual mean water levels over the period 1962 through 2002. Based on the figures in their report, and the regression parameters, the drawdown in 2002 caused by Ash Meadows pumping was approximately 0.25 feet (and decreasing because of the almost complete cessation of this pumping in 1978), by Amargosa Desert pumping was approximately 0.5 feet (and increasing), and by Army 1 pumping was approximately 0.2 feet (and decreasing because of decreases in pumping rates beginning in 1995).

Summary

1. Comparison of simulated and observed changes in water levels at Devils Hole through 2003 indicated that the DVRFS model overestimated the change in water

level caused by pumping in Amargosa Basin. There may be an error in the historical pumping dataset that affects this comparison. Although the model could be improved by additional work specifically in the Amargosa Desert and Ash Meadows areas, the pumping estimates developed for the model are reasonable.

2. The simulations predict that the three Project wells will cause water levels in Devils Hole to decline less than 0.05 ft after 200 years. When considering these predictions, it is important to recognize that the model overpredicted the decline in water levels caused by pumping in the Amargosa Basin and is not accurate to 0.05 ft but meters due to its original objective of modeling groundwater flow at a regional scale.
3. The model predicts that the Project pumping will reduce the discharge rate from springs at Ash Meadows a negligible amount of 7 afy or 0.05%.
4. Groundwater pumping in the Amargosa Farms area has caused tens of feet of drawdown near the pumping wells. Simple modeling using the Theis equation and superposition, coupled with regression procedures, indicates that the pumping in the Amargosa Farm area is the primary cause of the present-day drawdown at Devils Hole.

Abbreviations or Acronyms

afy – acre-feet per year
DOE – Department of Energy
DVRFS – Death Valley Regional Flow System
ET – evapotranspiration
ft – feet
in – inches
m – meters
UGTA – Underground Testing Area
USGS – United States Geological Survey
yr – year

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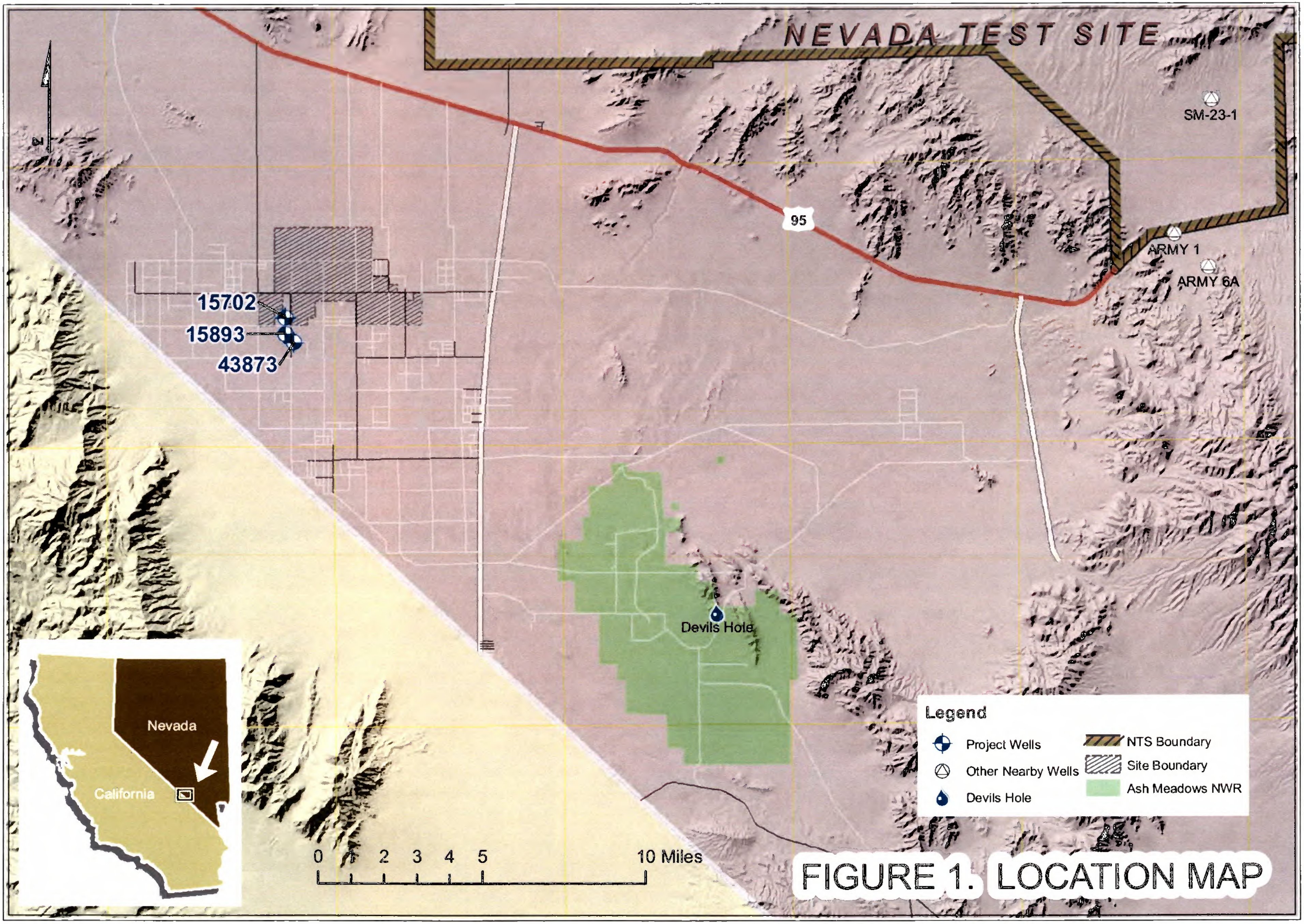

FIGURE 1. LOCATION MAP

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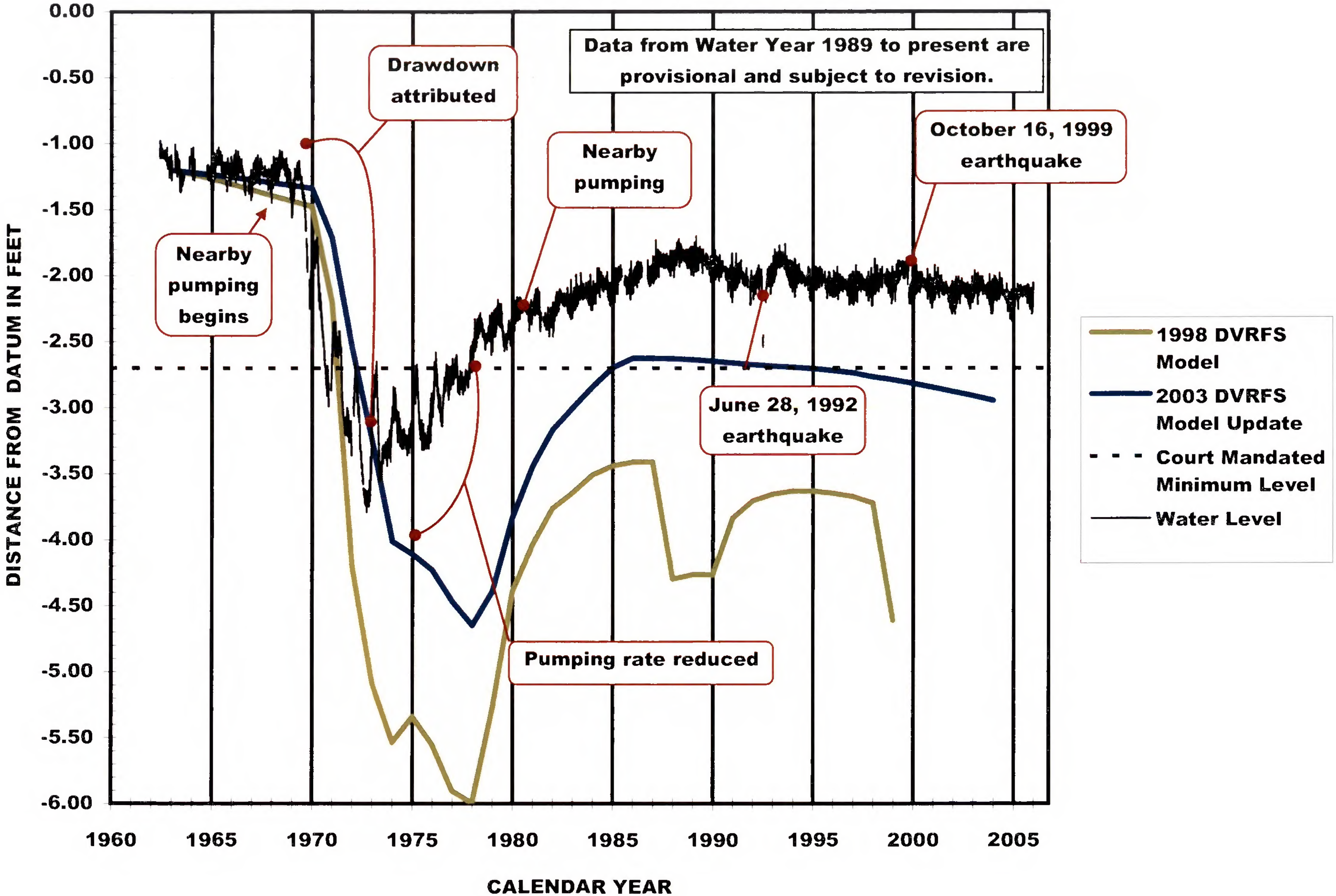
Figure 2. Level of Pool in Devil's Hole
Daily Mean (5/23/1962-12/31/2005)



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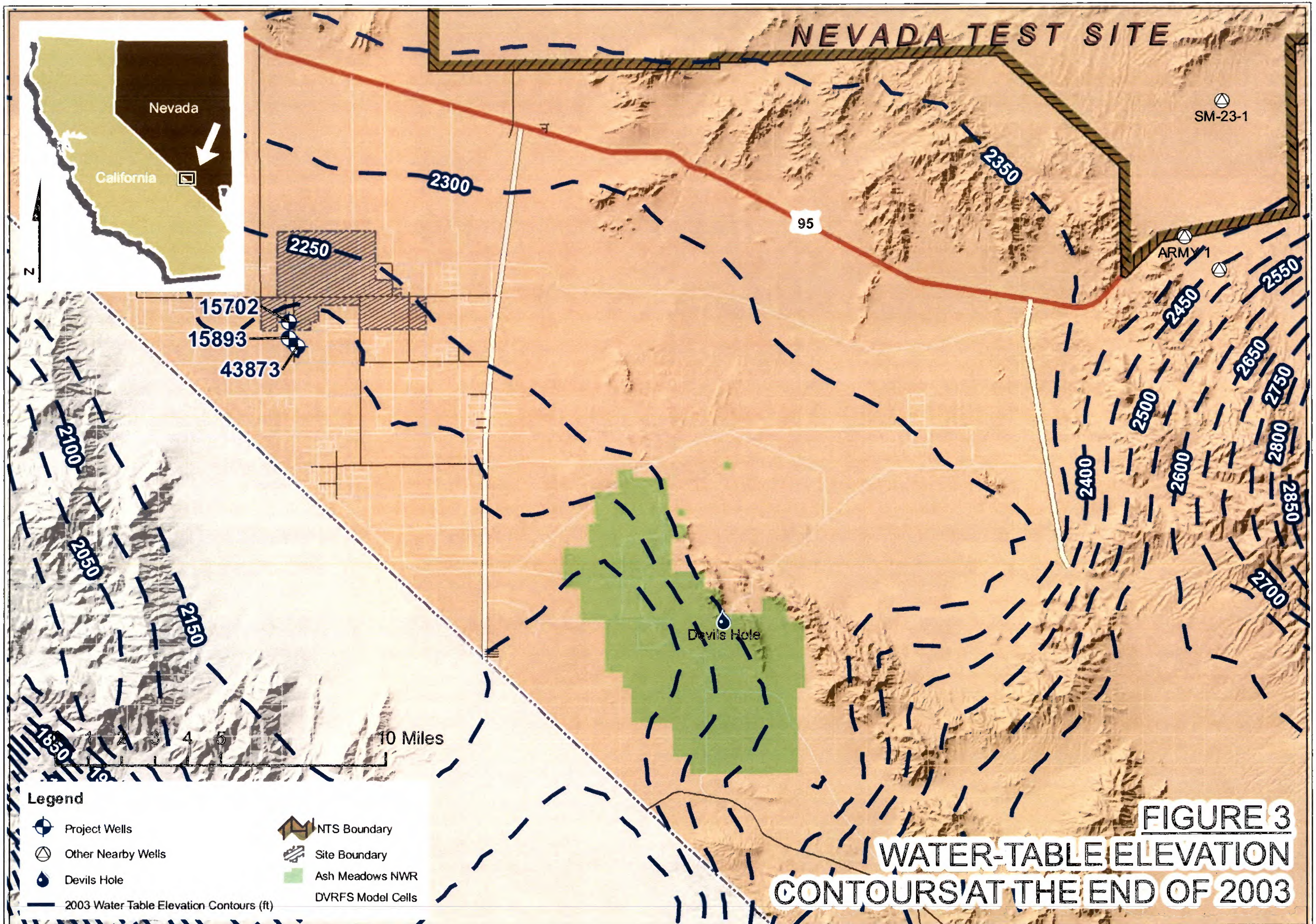


FIGURE 3
WATER-TABLE ELEVATION CONTOURS AT THE END OF 2003

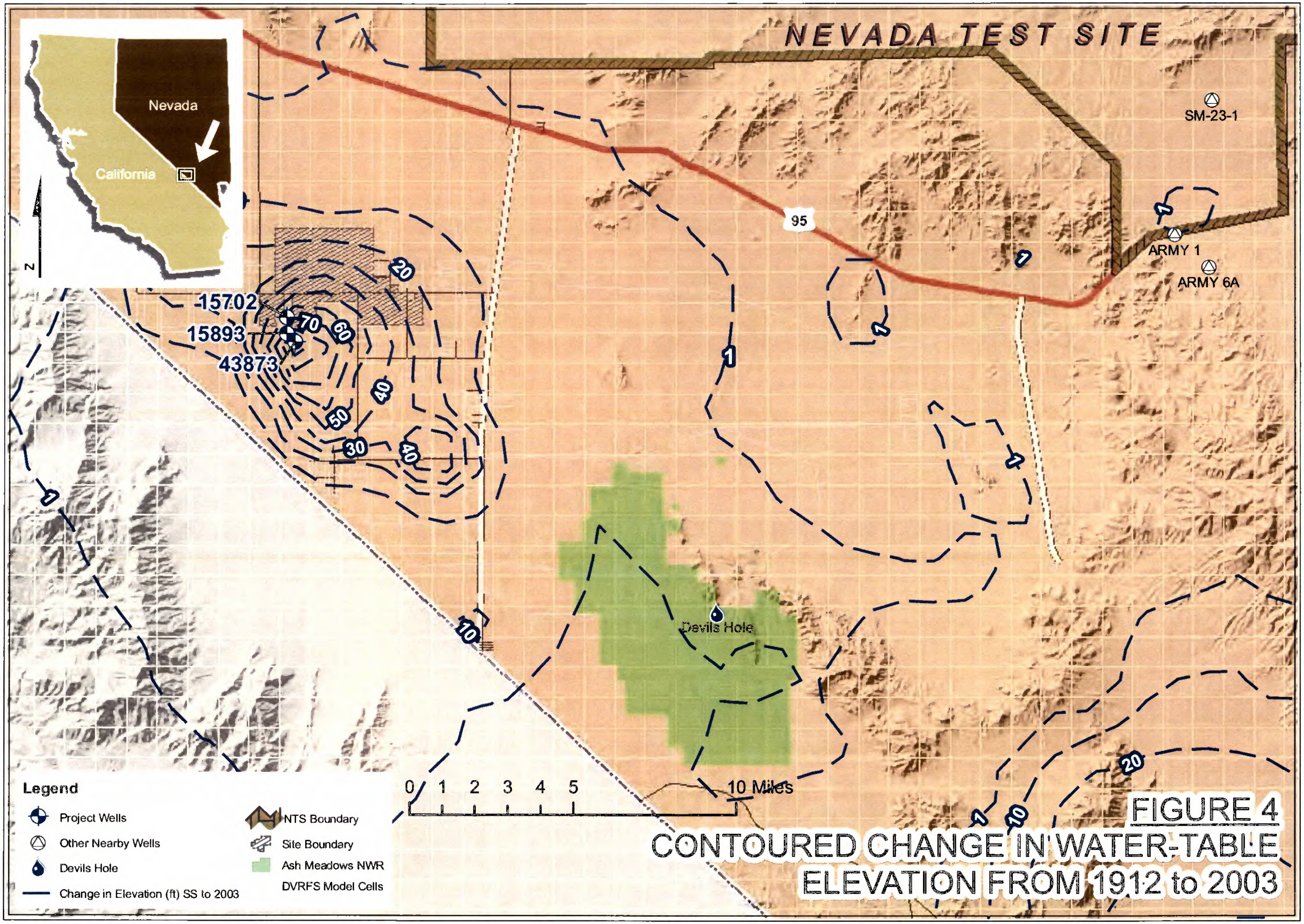


FIGURE 4
CONTOURED CHANGE IN WATER-TABLE ELEVATION FROM 1912 to 2003

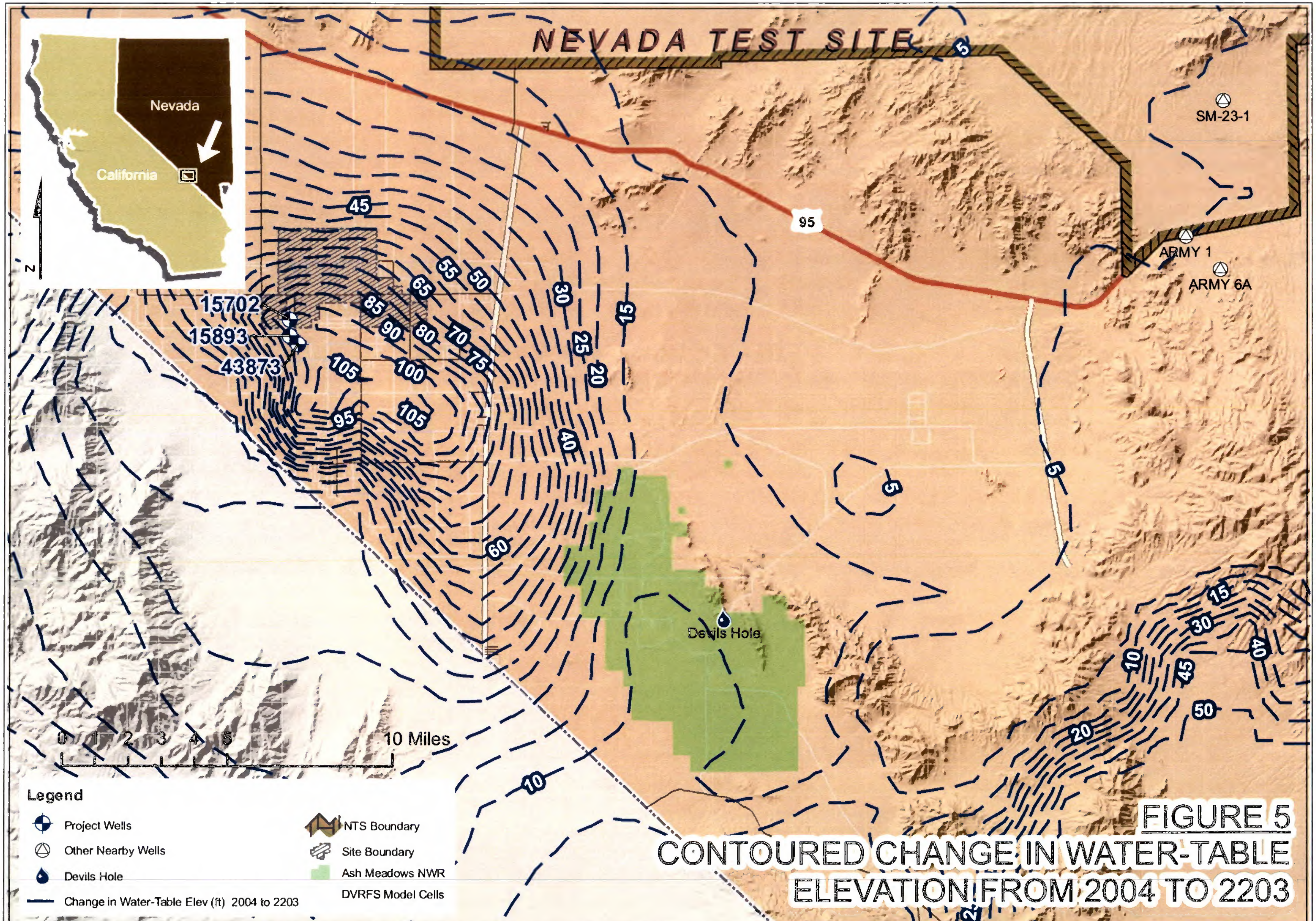


FIGURE 5
CONTOURED CHANGE IN WATER-TABLE ELEVATION FROM 2004 TO 2203

Figure 6. Change in Water-Level Elevation at Devil's Hole from 2003 to 2203

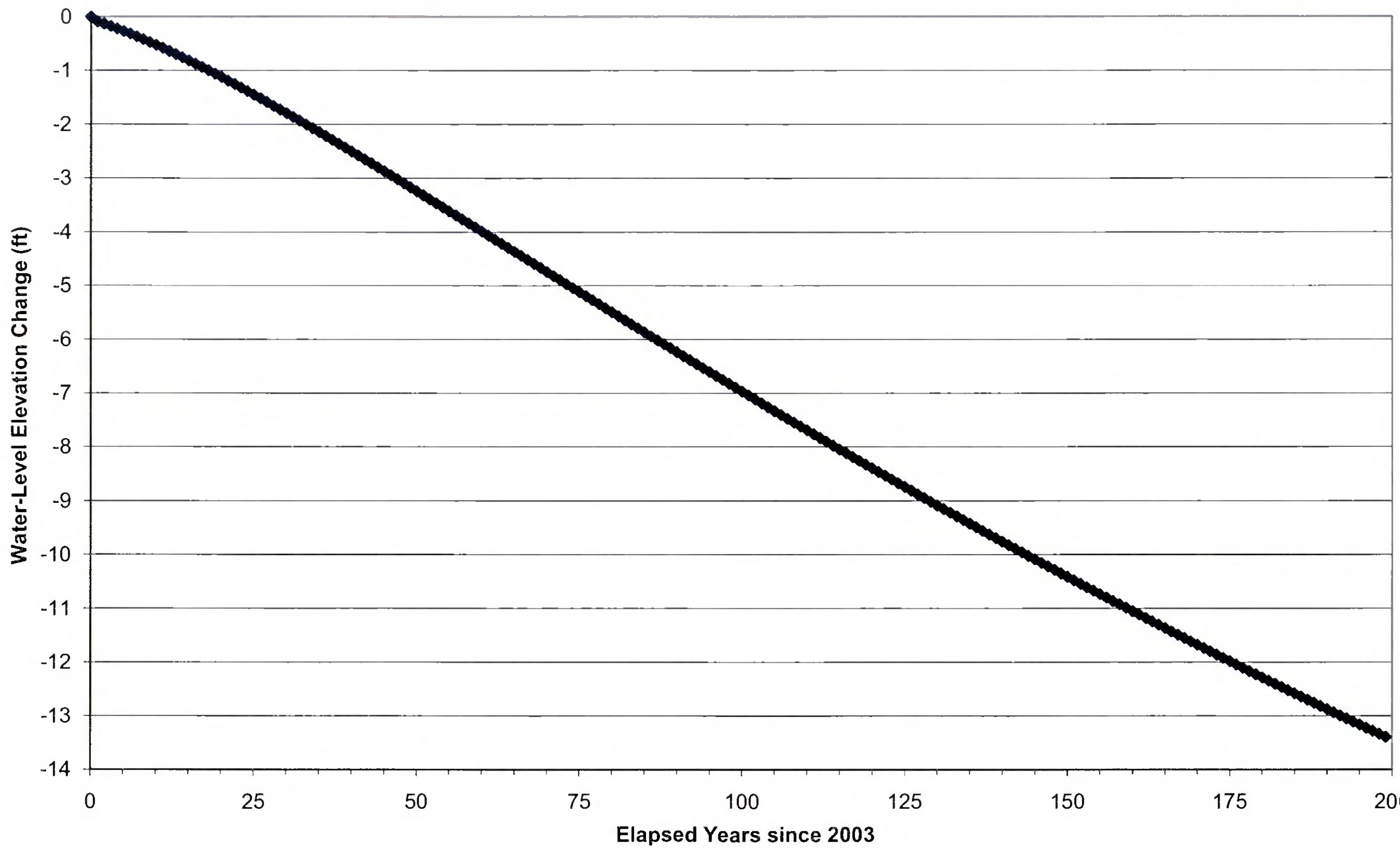


Figure 7. Change in Water-Level Elevation at Devil's Hole from Proposed Action Pumping from 2003 to 2203

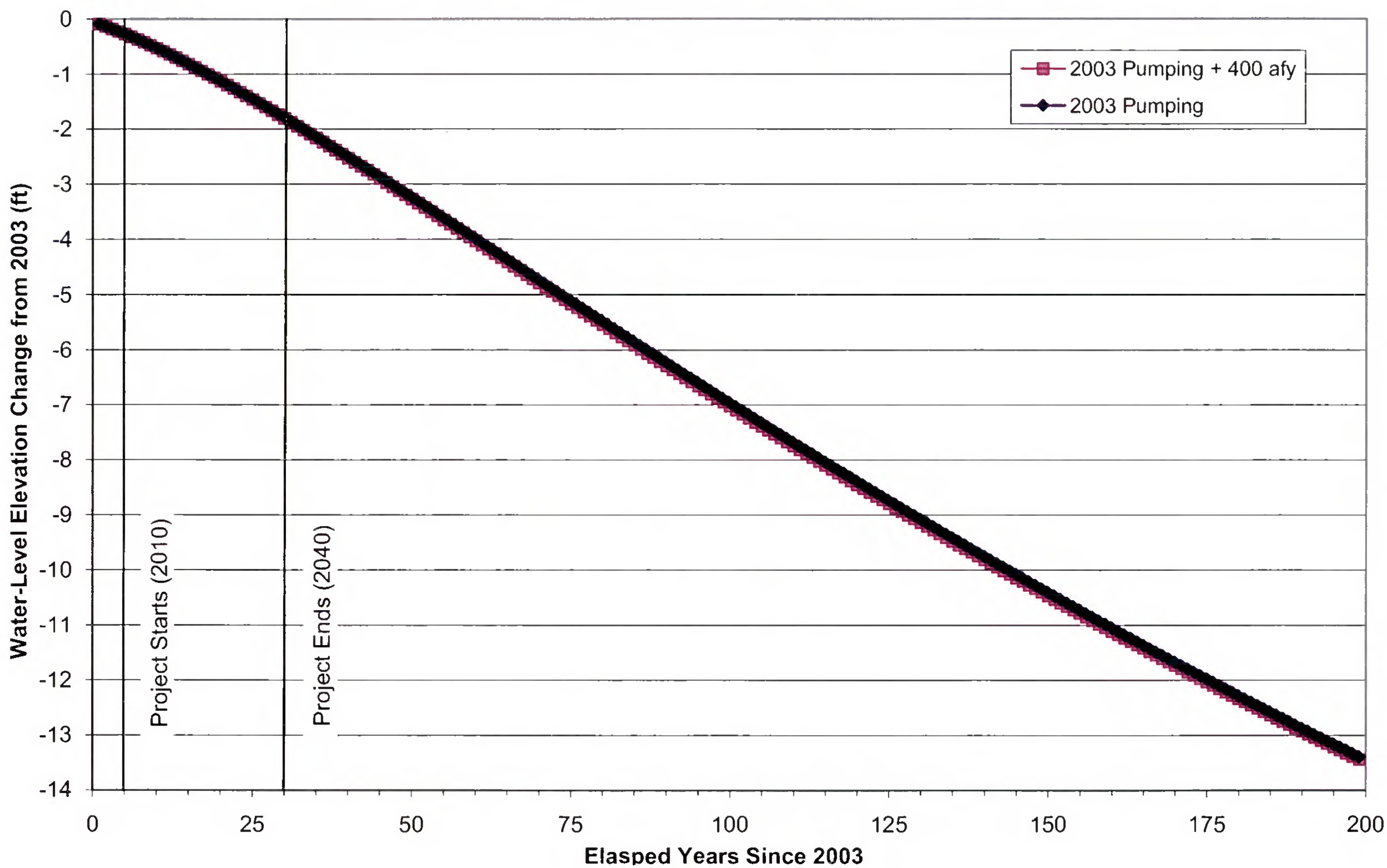


Figure 8. Effect of Reduced Amargosa Basin Pumping on Devil's Hole Water Levels from 2003 to 2203

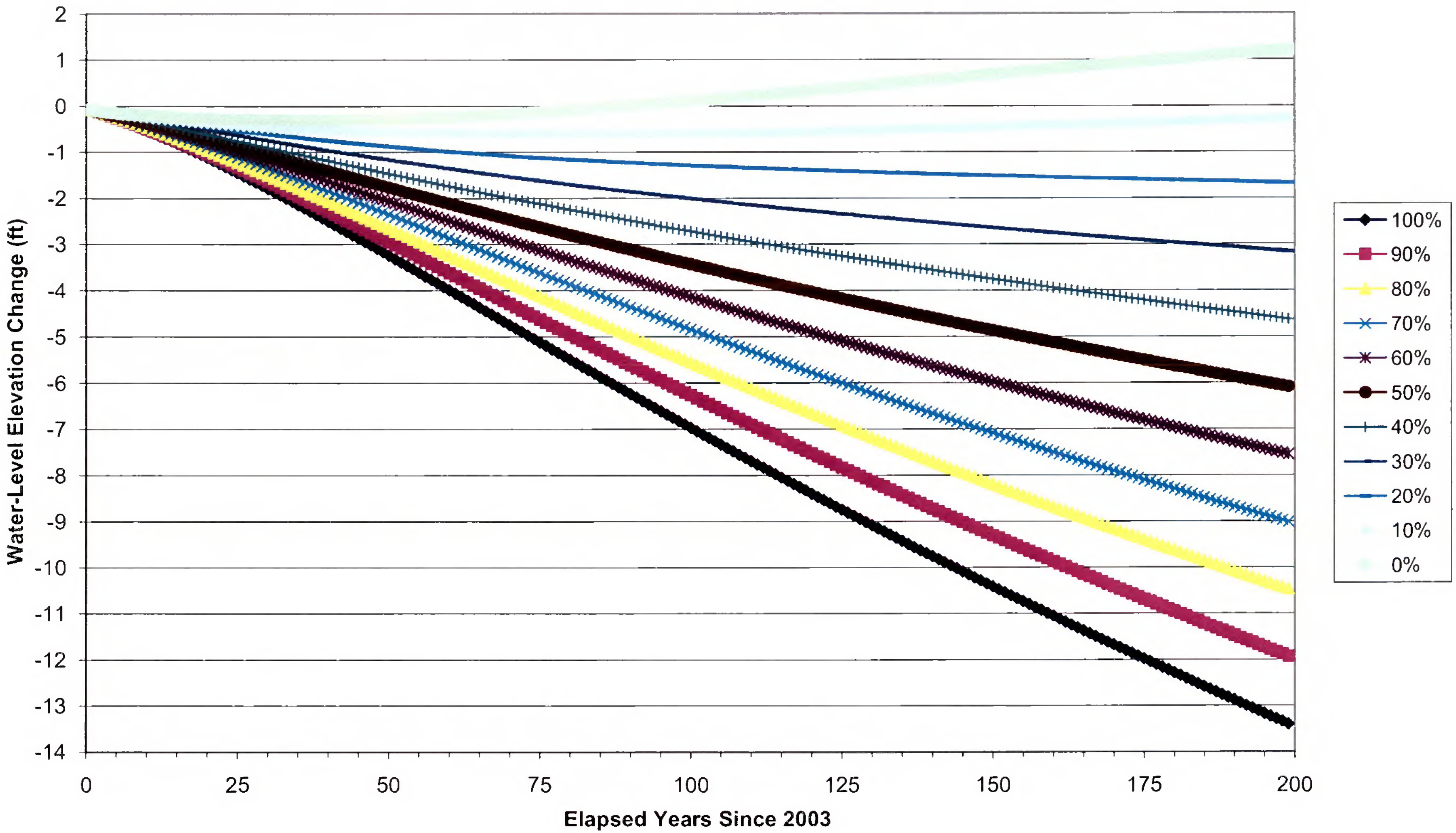


Figure 9. Effect of No Return Flow in Amargosa Basin from 2003 to 2203

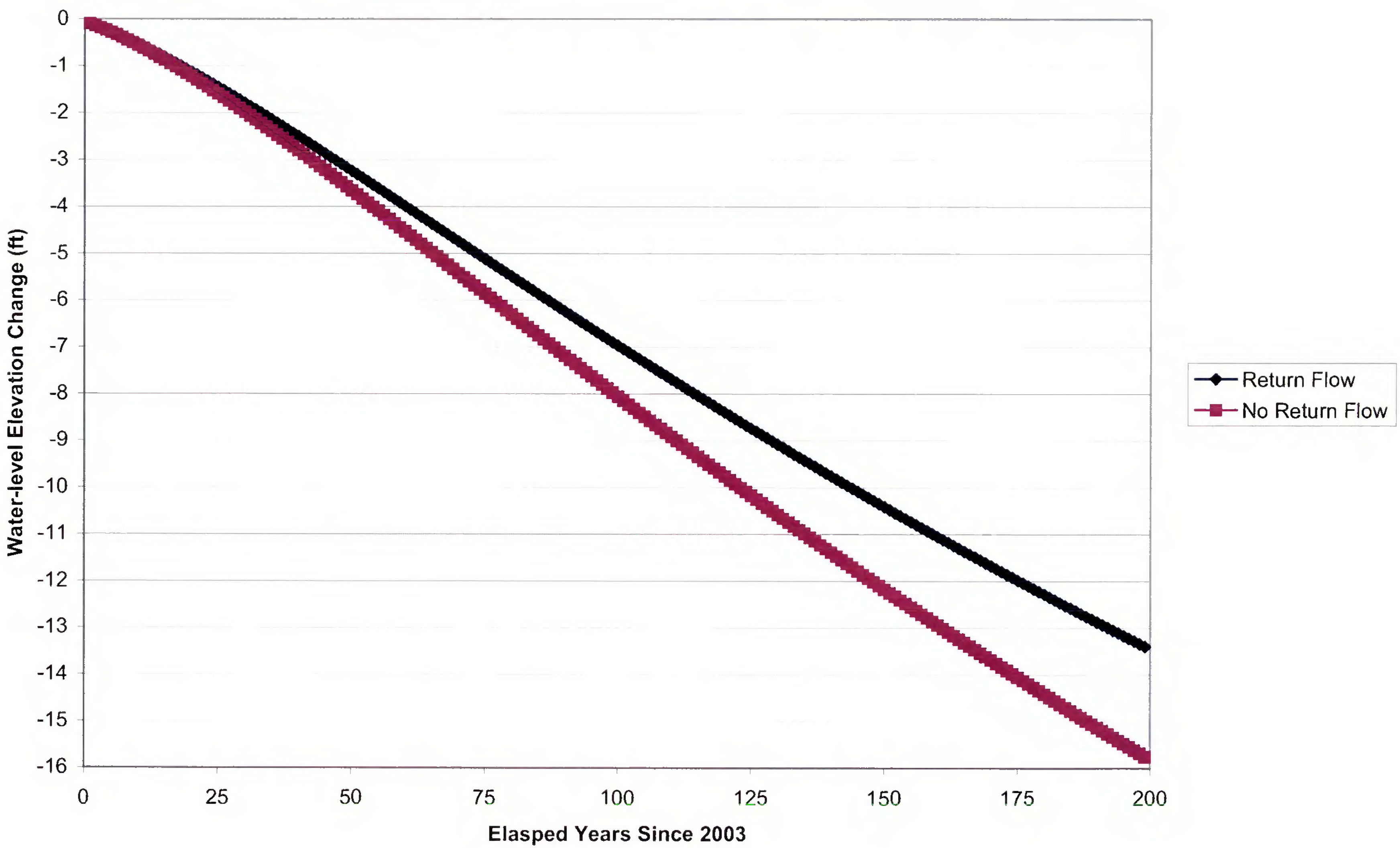
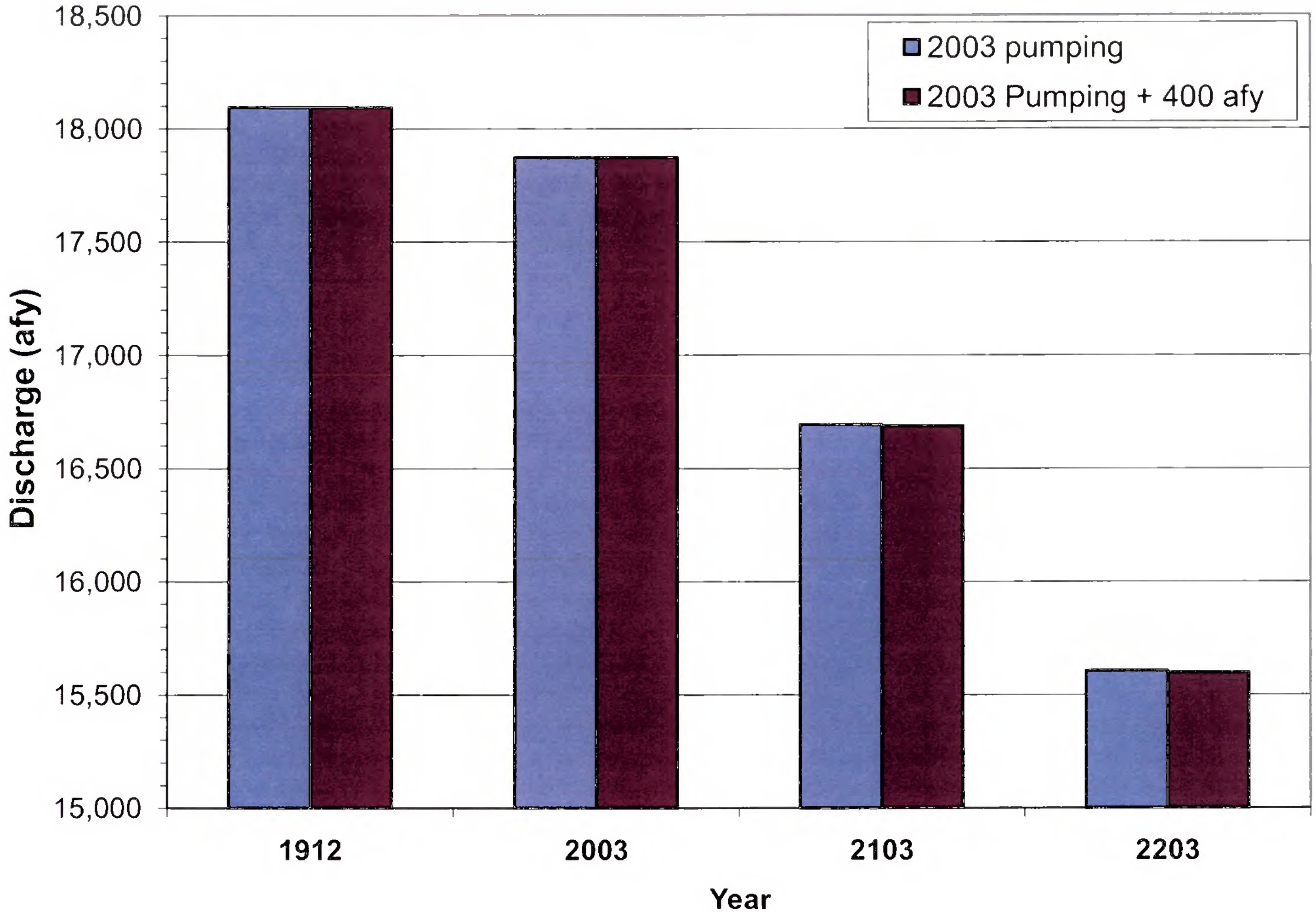


Figure 10. Comparison of the simulated effects of 2003 pumping, and 2003 pumping plus project pumping, on the discharge at Ash Meadows



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Appendix C

Authorized Right-of-Ways Within the Regional Area

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APPENDIX C – AUTHORIZED RIGHT-OF-WAYS WITHIN THE REGIONAL AREA

Serial Number	Status	Description
CACA 002784	AUTHORIZED	SOUTHERN CALIFORNIA EDISON CO - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
CACA 004178	AUTHORIZED	AMERICAN BORATE CO - ROW-WATER FACILITY - NON-ENERGY FACILITIES
CACA 007046	AUTHORIZED	BLM CAL SO - WDL-BLM-MISCELLANEOUS - NONE
CACA 026405	AUTHORIZED	VANDERBILT MINERALS - ROW-ROADS - NON-ENERGY FACILITIES
CACA 033530	AUTHORIZED	MARSH JIM - ROW-ROADS - NON-ENERGY FACILITIES
CACA 044983	AUTHORIZED	COUNTY OF INYO - ROW-OTHER-FLPMA - WATER
CARI 002570	AUTHORIZED	CA DEPT TRANSPORTATION - FED AID HIGHWAY(SEC 17) - NON-ENERGY FACILITIES
CAS 0020133	AUTHORIZED	TONOPAH & TIDEWATER RR - RR & STATIONS OUTSIDE AK - NON-ENERGY FACILITIES
NVCC 0009716	AUTHORIZED	GARNER M L - ROW-IRRIGATION FAC - NON-ENERGY FACILITIES
NVCC 0018078	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018241	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018267	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018274	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018275	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018276	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018323	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018384	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018385	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018386	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVCC 0018387	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVCC 0020258	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 17) - NON-ENERGY FACILITIES
NVCC 0020518	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 17) - NON-ENERGY FACILITIES
NVCC 0021745	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 00000202	AUTHORIZED	NYE COUNTY - SALE- REC & PUB PURPOSES - RECREATION PURPOSES
NVN 00131801	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - SALE- REC & PUB PURPOSES - PUBLIC PURPOSES

Serial Number	Status	Description
NVN 001520	AUTHORIZED	DOE - ROW-PWR LINE 44LD513 - OTHER ENERGY FACILITIES
NVN 001614	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 00218401	AUTHORIZED	S BAPTIST CHURCH - SALE- REC & PUB PURPOSES - PUBLIC PURPOSES
NVN 002739	AUTHORIZED	THRASHER EDWARD - ROW-IRRIGATION FAC - NON-ENERGY FACILITIES
NVN 003484	AUTHORIZED	CAPPAERT ENTERPRISES - ROW-IRRIGATION FAC - NON-ENERGY FACILITIES
NVN 003819	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 317) - NON-ENERGY FACILITIES
NVN 004707	AUTHORIZED	NPS - ROW-PWR LINE 44LD513 - OTHER ENERGY FACILITIES
NVN 004872	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN LINE - OTHER ENERGY FACILITIES
NVN 005305	AUTHORIZED	CAPPAERT ENTERPRISES - ROW-IRRIGATION FAC - NON-ENERGY FACILITIES
NVN 005307	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 005418	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 00601802	AUTHORIZED	AMARGOSA VALLEY IMPRV - SALE- REC & PUB PURPOSES - RECREATION PURPOSES
NVN 00648001	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - SALE- REC & PUB PURPOSES - PUBLIC PURPOSES
NVN 006846	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-WATER PLANTS - NON-ENERGY FACILITIES
NVN 007315	AUTHORIZED	AMERICAN BORATE CO - ROW-WATER PLANTS - NON-ENERGY FACILITIES
NVN 007479	AUTHORIZED	FAA - ROW-ROADS FEDERAL FAC - NON-ENERGY FACILITIES
NVN 010534	AUTHORIZED	BARRICK BULLFROG INC - ROW-WATER PLANTS - NON-ENERGY FACILITIES
NVN 016589	AUTHORIZED	AMERICAN BORATE CO - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 017151	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 017946	AUTHORIZED	EMBRY WILLIAM D - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 018354	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 019973	AUTHORIZED	DOE - ROW-WATER FACILITY FED - NON-ENERGY FACILITIES
NVN 02276901	PENDING	RECORDS LON H - DESERT LAND ACT
NVN 02277001	PENDING	RECORDS JEAN M - DESERT LAND ACT
NVN 02277101	PENDING	RECORDS CHERYL L - DESERT LAND ACT
NVN 024278	PENDING	RECORDS RICHARD C - SEC 7 CLASS - NONE
NVN 02427801	PENDING	RECORDS RICHARD C - DESERT LAND ACT
NVN 029793	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES

Serial Number	Status	Description
NVN 030559	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 031120	AUTHORIZED	NYE COUNTY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 033019	AUTHORIZED	AMERICAN BORATE CO - ROW-ROADS - NON-ENERGY FACILITIES
NVN 034043	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 035639	AUTHORIZED	NYE COUNTY - R&PP LEASE - SANITARY LANDFILLS
NVN 03563901	AUTHORIZED	NYE COUNTY - R&PP LEASE - SANITARY LANDFILLS
NVN 03563902	PENDING	NYE COUNTY - SALE- REC & PUB PURPOSES - SANITARY LANDFILLS
NVN 035976	AUTHORIZED	COST RED ENG INC - SALE- SEC 209 MIN FLPMA -
NVN 037198	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 037301	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 037511	AUTHORIZED	GS - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES
NVN 037616	AUTHORIZED	GS - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES
NVN 037728	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 039099	AUTHORIZED	MIELZYNSKI RAYMOND - ROW-ROADS - NON-ENERGY FACILITIES
NVN 039386	AUTHORIZED	LEWIS VERNA M - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 039408	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 039772	AUTHORIZED	JOHNSON NANCY E - SALE-SEC 203 & 209 FLPMA - NONE
NVN 039772	AUTHORIZED	JOHNSON RICHARD A - SALE-SEC 203 & 209 FLPMA - NONE
NVN 039862	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 039914	AUTHORIZED	BRAY LAWRENCE - ROW-ROADS - NON-ENERGY FACILITIES
NVN 039914	AUTHORIZED	BRAY LINDA - ROW-ROADS - NON-ENERGY FACILITIES
NVN 042531	AUTHORIZED	NYE COUNTY - R&PP CLASS - RECREATION PURPOSES
NVN 04253101	AUTHORIZED	NYE COUNTY - R&PP CLASS - RECREATION PURPOSES
NVN 042735	AUTHORIZED	FAA - WDL-FED AVIATION ADMIN - SUBJECT TO PRIOR RIGHTS
NVN 043044	AUTHORIZED	NYE COUNTY - ROW-ROADS UNDER RS 2477 - NON-ENERGY FACILITIES
NVN 043247	AUTHORIZED	DOE (NNSA-SC NV) - ROW-COMM SITE FED FAC - NON-ENERGY FACILITIES
NVN 043366	AUTHORIZED	ALLIED BUILDING MATERIALS - ROW-ROADS - NON-ENERGY FACILITIES
NVN 043752	AUTHORIZED	NYE COUNTY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 043919	AUTHORIZED	NYE COUNTY - ROW-ROADS UNDER RS 2477 - NON-ENERGY FACILITIES
NVN 045126	AUTHORIZED	NYE COUNTY - R&PP CLASS - RECREATION PURPOSES
NVN 04512601	AUTHORIZED	NYE COUNTY - R&PP CLASS - RECREATION PURPOSES

Serial Number	Status	Description
NVN 045241	AUTHORIZED	NYE COUNTY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 047001	AUTHORIZED	NYE COUNTY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 047397	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - FIBER OPTIC FACILITIES
NVN 047748	AUTHORIZED	DOE (OFC OF CVL RAD WST MGT) - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES
NVN 047766	AUTHORIZED	NYE COUNTY - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048113	AUTHORIZED	MONK WILLIAM H JR - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048113	AUTHORIZED	SAGE MICHAEL A - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048552	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 048560	AUTHORIZED	MONK WILLIAM H JR - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048560	AUTHORIZED	SAGE MICHAEL A - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048561	AUTHORIZED	CATHCART H E & Z W - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048562	AUTHORIZED	HANNIGAN ELI DAVID - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048563	AUTHORIZED	SHINE LARRY L - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048564	AUTHORIZED	DAILEY THOMAS A - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048564	AUTHORIZED	DAILEY WANDA L - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048565	AUTHORIZED	HANNIGAN ELI DAVID - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048566	AUTHORIZED	EAVES CLIFFORD R - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048566	AUTHORIZED	EAVES KATHRYN M - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048567	AUTHORIZED	CLOGSTON JOHN H - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048568	AUTHORIZED	CLOGSTON JOHN H - SALE-SEC 203 & 209 FLPMA - NONE
NVN 048703	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 048797	AUTHORIZED	NYE COUNTY - R&PP CLASS - RECREATION PURPOSES
NVN 048876	AUTHORIZED	BARR CHARLES M - ROW-ROADS - NON-ENERGY FACILITIES
NVN 048915	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-ROADS - NON-ENERGY FACILITIES
NVN 049529	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 049614	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - SALE-SEC 203 & 209 FLPMA - NONE
NVN 049647	AUTHORIZED	NYE COUNTY - ROW-ROADS UNDER RS 2477 - NON-ENERGY FACILITIES
NVN 049648	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 049709	AUTHORIZED	FWS - ACQ-BUR SPORT F & W
NVN 049709	AUTHORIZED	NATURE CONSERVANCY - ACQ-BUR SPORT F & W
NVN 049710	AUTHORIZED	FWS - ACQ-BUR SPORT F & W
NVN 049710	AUTHORIZED	NATURE CONSERVANCY - ACQ-BUR SPORT F & W

Serial Number	Status	Description
NVN 050038	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 051002	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 051039	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 051061	AUTHORIZED	VERRILLI ALBERT - ROW-ROADS - NON-ENERGY FACILITIES
NVN 051061	AUTHORIZED	VERRILLI MICHAEL - ROW-ROADS - NON-ENERGY FACILITIES
NVN 051231	AUTHORIZED	UNIVERSITY OF NV RENO - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES
NVN 051405	AUTHORIZED	LEWIS DELBERT T - SALE-PUBLIC LANDS-FLPMA - NONE
NVN 051405	AUTHORIZED	LEWIS VERNA M - SALE-PUBLIC LANDS-FLPMA - NONE
NVN 051406	AUTHORIZED	LEWIS DELBERT T - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051406	AUTHORIZED	LEWIS VERNA M - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051407	AUTHORIZED	RISINGER DONALD W - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051407	AUTHORIZED	RISINGER EDITH V - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051408	AUTHORIZED	RISINGER DONALD W - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051408	AUTHORIZED	RISINGER EDITH V - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051409	AUTHORIZED	JOHNSON NANCY E - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051409	AUTHORIZED	JOHNSON RICHARD A - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051410	AUTHORIZED	JOHNSON NANCY E - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051410	AUTHORIZED	JOHNSON RICHARD A - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051411	AUTHORIZED	JOHNSON NANCY E - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051411	AUTHORIZED	JOHNSON RICHARD A - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051412	AUTHORIZED	BLM - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051412	AUTHORIZED	CLOGSTON JOHN H - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051413	AUTHORIZED	CLOGSTON JOHN H - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051414	AUTHORIZED	CLOGSTON JOHN H - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051415	AUTHORIZED	CLOGSTON JOHN H - SALE-SEC 203 & 209 FLPMA - NONE
NVN 051416	AUTHORIZED	BEATTY GENERAL IMPROVEMENT DISTRICT - R&PP CLASS - RECREATION PURPOSES
NVN 05141601	AUTHORIZED	BEATTY GENERAL IMPROVEMENT DISTRICT - R AND PP LEASE - RECREATION PURPOSES
NVN 051538	AUTHORIZED	NYE COUNTY - SALE- SEC 209 MIN FLPMA - TO BE DEFINED
NVN 051544	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 051900	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 052412	AUTHORIZED	EAGLE WEST LLC - ROW-COMM SITE, FLPMA - NON-ENERGY FACILITIES

Serial Number	Status	Description
NVN 052438	AUTHORIZED	BEATTY TOWN ADVISORY BOARD - ROW-COMM SITE, FLPMA - NON-ENERGY FACILITIES
NVN 052458	AUTHORIZED	NYE COUNTY - SALE-SEC 203 & 209 FLPMA - NONE
NVN 052545	AUTHORIZED	NYE COUNTY SCHOOL DISTRICT - R&PP CLASS - PUBLIC PURPOSES
NVN 052571	AUTHORIZED	VANDERBILT MINERALS CORP - ROW-ROADS - NON-ENERGY FACILITIES
NVN 052811	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 052950	AUTHORIZED	BLM - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES
NVN 052952	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 053354	AUTHORIZED	FINCHER JAMES H - ROW-ROADS - NON-ENERGY FACILITIES
NVN 054004	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 054021	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 054086	PENDING	NYE COUNTY NUCLEAR WASTE REPOSITORY - R&PP CLASS - PUBLIC PURPOSES
NVN 05408601	PENDING	NYE COUNTY - R AND PP LEASE - PUBLIC PURPOSES
NVN 054997	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 056378	AUTHORIZED	BLM - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES
NVN 056477	AUTHORIZED	NYE COUNTY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 057471	AUTHORIZED	NYE COUNTY - R&PP LEASE - SANITARY LANDFILLS
NVN 05747101	PENDING	NYE COUNTY - SALE- REC & PUB PURPOSES - SANITARY LANDFILLS
NVN 058118	AUTHORIZED	FHWA - MATERIAL SITES(SEC 317) - NON-ENERGY FACILITIES
NVN 058533	AUTHORIZED	FS - WDL-FS NATL REC AREA - SUBJECT TO PRIOR RIGHTS
NVN 059971	AUTHORIZED	BLM - SALE-SEC 203 & 209 FLPMA - NONE
NVN 059971	AUTHORIZED	MCMILLEN FLORITA - SALE-SEC 203 & 209 FLPMA - NONE
NVN 059971	AUTHORIZED	MCMILLEN FRED III - SALE-SEC 203 & 209 FLPMA - NONE
NVN 060293	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - NON-ENERGY FACILITIES
NVN 060401	AUTHORIZED	NYE COUNTY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 060422	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 060568	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 060825	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 060913	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 060964	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 060965	PENDING	BEATTY WATER & SANITATION DISTRICT - ROW-ROADS - NON-

Serial Number	Status	Description
		ENERGY FACILITIES
NVN 061167	AUTHORIZED	UNIVERSITY OF NV RENO - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES
NVN 061194	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 061276	PENDING	MARSH JIM - AIRPORT LEASES
NVN 061321	PENDING	IMV - ROW-ROADS - NON-ENERGY FACILITIES
NVN 061968FD	PENDING	BLM - EX-BLM SEC 206, FLPMA
NVN 062062	PENDING	WESTEC - PERMITS SEC 302 FLPMA - OTHER
NVN 062314	PENDING	NYE COUNTY - ROW-OTHER-FLPMA - NON-ENERGY FACILITIES
NVN 062627	AUTHORIZED	NYE COUNTY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 062848	AUTHORIZED	NYE COUNTY NUC WST REPOS - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 062861	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 062888	AUTHORIZED	UNIVERSITY OF NV RENO - ROW-OTHER-FLPMA - NON-ENERGY FACILITIES
NVN 062946	PENDING	PONDEROSA DAIRY - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 063346	AUTHORIZED	DAVIS RONALD - ROW-ROADS - NON-ENERGY FACILITIES
NVN 063346	AUTHORIZED	DAVIS SHELAGH - ROW-ROADS - NON-ENERGY FACILITIES
NVN 065700FD	AUTHORIZED	BARRICK BULLFROG INC - EX-BLM SEC 206, FLPMA - NONE
NVN 065700PT	AUTHORIZED	BARRICK BULLFROG INC - EX-BLM SEC 206, FLPMA - NONE
NVN 065700PT	AUTHORIZED	BLM - EX-BLM SEC 206, FLPMA - NONE
NVN 065782	AUTHORIZED	NYE COUNTY - R&PP LEASE - SANITARY LANDFILLS
NVN 06578201	PENDING	NYE COUNTY - SALE- REC & PUB PURPOSES - SANITARY LANDFILLS
NVN 065838	PENDING	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 066239	AUTHORIZED	NYE COUNTY - SALE-SNPLMA - OTHER - NONE
NVN 06623901	AUTHORIZED	NYE COUNTY - SALE-SNPLMA - OTHER - NONE
NVN 066431	PENDING	MECCA DEVELOPMENT CO LLC - AIRPORT LEASES
NVN 066534	AUTHORIZED	BEATTY WATER & SANITATION DISTRICT - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 066744	AUTHORIZED	UNIVERSITY OF NV RENO - ROW-COMM SITE, FLPMA - NON-ENERGY FACILITIES
NVN 066757	AUTHORIZED	MURPHY RON - ROW-ROADS - NON-ENERGY FACILITIES
NVN 066786	AUTHORIZED	BLM - SALE-SEC 203 & 209 FLPMA - NONE
NVN 066786	AUTHORIZED	KEY JAMES RICHARD - SALE-SEC 203 & 209 FLPMA - NONE
NVN 073693	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - FIBER OPTIC FACILITIES
NVN 073706	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - FIBER OPTIC FACILITIES

Serial Number	Status	Description
NVN 073931	AUTHORIZED	BLM - WDL-BLM-MISCELLANEOUS - SUBJECT TO PRIOR RIGHTS
NVN 074034	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 074242	AUTHORIZED	GS - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 074535	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 074682	PENDING	ALLIED BUILDING MATERIALS - PERMITS SEC 302 FLPMA - NON-ENERGY FACILITIES
NVN 075207	AUTHORIZED	BARRICK BULLFROG INC - ROW-ROADS - NON-ENERGY FACILITIES
NVN 075240	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - FIBER OPTIC FACILITIES
NVN 075481	AUTHORIZED	FWS - ACQ-FWS - NONEXCLUSIVE
NVN 075482	AUTHORIZED	FWS - ACQ-FWS - NONEXCLUSIVE
NVN 076426	AUTHORIZED	RINGLE EDWARD - SALE-PUBLIC LANDS-FLPMA - NONE
NVN 07652701	AUTHORIZED	NYE COUNTY - SALE- REC & PUB PURPOSES - SANITARY LANDFILLS
NVN 076533	AUTHORIZED	TURNER RANCH LLC - SALE-PUBLIC LANDS-FLPMA
NVN 076554	AUTHORIZED	BLM - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES
NVN 076578	AUTHORIZED	BLM - SALE-SEC 203 & 209 FLPMA - NONE
NVN 076578	AUTHORIZED	PONDEROSA DAIRY - SALE-SEC 203 & 209 FLPMA - NONE
NVN 076579	AUTHORIZED	BLM - SALE-SEC 203 & 209 FLPMA - NONE
NVN 076579	AUTHORIZED	PONDEROSA DAIRY - SALE-SEC 203 & 209 FLPMA - NONE
NVN 076865	AUTHORIZED	BLM - WDL-BLM-SPECIAL DESIGNAT - SUBJECT TO PRIOR RIGHTS
NVN 076893	AUTHORIZED	USGS - ROW-ROADS FEDERAL FAC - NON-ENERGY FACILITIES
NVN 077119	PENDING	NYE COUNTY - R&PP CLASS - SANITARY LANDFILLS
NVN 07711901	PENDING	NYE COUNTY - R AND PP LEASE - SANITARY LANDFILLS
NVN 077252	AUTHORIZED	BARRICK BULLFROG INC - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 077586	AUTHORIZED	DOE - ROW-OTHER-FLPMA - NON-ENERGY FACILITIES
NVN 077605	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 077880	AUTHORIZED	DOE - WDL-DEPT OF ENERGY MISC - SUBJECT TO PRIOR RIGHTS
NVN 079714	AUTHORIZED	NYE COUNTY ROAD DEPT - ROW-ROADS - NON-ENERGY FACILITIES
NVN 080657	AUTHORIZED	NYE COUNTY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 080659	PENDING	TOWN OF PAHRUMP - R&PP CLASS - PUBLIC PURPOSES
NVN 08065901	PENDING	TOWN OF PAHRUMP - R AND PP LEASE - PUBLIC PURPOSES
NVN 081408	AUTHORIZED	NEVADA BELL - ROW-TEL & TELEG,FLPMA - FIBER OPTIC FACILITIES
NVN 081543	AUTHORIZED	NYE COUNTY SHERIFF - ROW-COMM SITE, FLPMA - NON-ENERGY FACILITIES
NVN 081791	PENDING	USGS - ROW-OTHER FEDERAL FAC - NON-ENERGY FACILITIES

Serial Number	Status	Description
NVN 082043	AUTHORIZED	FOSTER JERRY - ROW-ROADS - NON-ENERGY FACILITIES
NVN 082993	AUTHORIZED	FHWA - MATERIAL SITES(SEC 317) - NON-ENERGY FACILITIES
NVN 082993	AUTHORIZED	NEVADA DEPT OF TRANSPORTATION - MATERIAL SITES(SEC 317) - NON-ENERGY FACILITIES
NVN 083150	PENDING	COGENTRIX SOLAR SERVICES LLC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 083220	PENDING	COGENTRIX SOLAR SERVICES LLC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 083221	PENDING	COGENTRIX SOLAR SERVICES LLC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 083311	PENDING	NYE CNTY SCHOOL DISTRICT - R&PP CLASS - RECREATION PURPOSES
NVN 08331101	PENDING	NYE COUNTY SCHOOL DISTRICT - R AND PP LEASE - RECREATION PURPOSES
NVN 083312	PENDING	NYE CNTY SCHOOL DISTRICT - R&PP CLASS - RECREATION PURPOSES
NVN 08331201	PENDING	NYE COUNTY SCHOOL DISTRICT - R AND PP LEASE - RECREATION PURPOSES
NVN 084014	AUTHORIZED	DESERT FARMS INC - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 084067	PENDING	ALTAGAS RENEWABLE ENERGY PAC - ROW-WIND PROJ TEST - WIND ENERGY FACILITIES
NVN 084247	AUTHORIZED	NYE COUNTY PUBLIC WORKS - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 084284	PENDING	NYE CNTY SCHOOL DISTRICT - R&PP CLASS - RECREATION PURPOSES
NVN 08428401	PENDING	NYE COUNTY SCHOOL DISTRICT - R AND PP LEASE - RECREATION PURPOSES
NVN 084359	PENDING	SOLAR MILLENNIUM LLC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 084465	PENDING	PACIFIC SOLAR INVESTMENTS INC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 084466	PENDING	PACIFIC SOLAR INVESTMENTS INC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 084614	PENDING	DIANA HARTZELL - ROW-ROADS - NON-ENERGY FACILITIES
NVN 084704	PENDING	AMARGOSA FLATS ENERGY LLC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 085009	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 085201	PENDING	EWINDFARM INC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 085746	PENDING	DESERT RESEARCH INSTITUTE - ROW-POWER TRAN-FLPMA - WIND ENERGY FACILITIES
NVN 086217	PENDING	NYE COUNTY SOLAR I, LLC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 086234	PENDING	DOE - ROW-COMM SITE FED FAC - NON-ENERGY FACILITIES
NVN 086246	PENDING	AUSRA NV 1 LLC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 086279	PENDING	DOE - ROW-PWR LINE FED FAC - OTHER ENERGY FACILITIES

Serial Number	Status	Description
NVN 086295	PENDING	BLM - SALE-SNPLMA - GENERAL - NONE
NVN 086296	PENDING	BLM - SALE-SNPLMA - GENERAL - NONE
NVN 086297	PENDING	BLM - SALE-SNPLMA - GENERAL - NONE
NVN 086298	PENDING	BLM - SALE-SNPLMA - GENERAL - NONE
NVN 086299	PENDING	BLM - SALE-SNPLMA - GENERAL - NONE
NVN 086571	PENDING	ABENGOA SOLAR INC - ROW-POWER TRAN-FLPMA - SOLAR ENERGY FACILITIES
NVN 086612	AUTHORIZED	UNIVERSITY OF NEVADA LAS VEGAS - ROW-OTHER-FLPMA - NON-ENERGY FACILITIES
NVN 086787	AUTHORIZED	AMERICAN LAND CONSERVANCY - ACQ-FWS - NONE
NVN 086787	AUTHORIZED	FWS - ACQ-FWS - NONE
NVN 086788	AUTHORIZED	FWS - ACQ-FWS - NONE
NVN 086788	AUTHORIZED	KOZAL MARY V - ACQ-FWS - NONE
NVN 086788	AUTHORIZED	KOZAL VICTOR - ACQ-FWS - NONE
NVN 087313	AUTHORIZED	PACIFIC SOLAR INVESTMENTS INC - PERMITS SEC 302 FLPMA - SOLAR ENERGY FACILITIES
NVN 087440	PENDING	BLM - ROW-COMM SITE, FLPMA - NON-ENERGY FACILITIES
NVN 087804	PENDING	BEATTY WATER & SANITATION DISTRICT - ROW-WATER FACILITY - NON-ENERGY FACILITIES
NVN 087838	PENDING	BEATTY WATER & SANITATION DISTRICT - PERMITS SEC 302 FLPMA - NON-ENERGY FACILITIES
NVN 0042808	AUTHORIZED	NV DEPT OF TRANS - ROW-FS FED AID HWYSEC317 - NON-ENERGY FACILITIES
NVN 0042814	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 107) - NON-ENERGY FACILITIES
NVN 0043305	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVN 0043306	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 17) - NON-ENERGY FACILITIES
NVN 0044010	AUTHORIZED	DOE - ROW-ROADS FED 44LD513 - NON-ENERGY FACILITIES
NVN 0045108	AUTHORIZED	FAA - WDL-FED AVIATION ADMIN - SUBJECT TO PRIOR RIGHTS
NVN 0045546	AUTHORIZED	NV POWER CO - ROW-ISSUED BY AEC - OTHER ENERGY FACILITIES
NVN 0045845	AUTHORIZED	NV POWER CO - ROW-POWER TRAN LINE - OTHER ENERGY FACILITIES
NVN 0046490	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVN 0046516	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVN 0048083	AUTHORIZED	GS - ROW-WATER FAC44LD513 - NON-ENERGY FACILITIES
NVN 0049847	AUTHORIZED	BLM - SMALL TRACT CLASS - SUBJECT TO PRIOR RIGHTS
NVN 0054659	AUTHORIZED	PETERSON MERRILL H - ROW-IRRIGATION FAC - NON-ENERGY FACILITIES
NVN 0054920	AUTHORIZED	RHYOLITE CITY OF - ROW-WATER PLANTS - NON-ENERGY FACILITIES

Serial Number	Status	Description
NVN 0054920	AUTHORIZED	SPENCER JAMES J - ROW-WATER PLANTS - NON-ENERGY FACILITIES
NVN 0057586	AUTHORIZED	NV POWER CO - ROW-PWR FACILITIES - OTHER ENERGY FACILITIES
NVN 0057750	AUTHORIZED	NV DIVISION OF STATE LANDS - R&PP CLASS - SANITARY LNDFIL/HAZRDOUS
NVN 005775001	AUTHORIZED	NV DIVISION OF STATE LANDS - R AND PP LEASE - SANITARY LNDFIL/HAZRDOUS
NVN 0058116	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-PWR FACILITIES - OTHER ENERGY FACILITIES
NVN 0058190	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-PWR FACILITIES - OTHER ENERGY FACILITIES
NVN 0058398	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 317) - NON-ENERGY FACILITIES
NVN 0058536	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-PWR FACILITIES - OTHER ENERGY FACILITIES
NVN 0059062	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 317) - NON-ENERGY FACILITIES
NVN 0059100	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES
NVN 0059432	AUTHORIZED	NEVADA BELL - ROW-TELEPHONE-TELEGRAPH 4 - NON-ENERGY FACILITIES
NVN 0064693	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-PWR FACILITIES - OTHER ENERGY FACILITIES
NVN 0065139	AUTHORIZED	NEVADA BELL - ROW-TELEPHONE-TELEGRAPH 4 - NON-ENERGY FACILITIES
NVN 0065209	AUTHORIZED	NEVADA BELL - ROW-TELEPHONE-TELEGRAPH 4 - FIBER OPTIC FACILITIES
NVN 0065893	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 17) - NON-ENERGY FACILITIES
NVN 0065993	AUTHORIZED	NV DEPT OF TRANS - FED AID HIGHWAY(SEC 317) - NON-ENERGY FACILITIES
NVN 0066111	AUTHORIZED	AMERICAN TOWER CORP - ROW-COMM SITE, 1911 - NON-ENERGY FACILITIES
NVN 0066267	AUTHORIZED	NV DEPT OF TRANS - MATERIAL SITES(SEC 317) - NON-ENERGY FACILITIES
NVN 0066289	AUTHORIZED	VALLEY ELECTRIC ASSOCIATION - ROW-POWER TRAN-FLPMA - OTHER ENERGY FACILITIES

Appendix D

Key Observation Point Worksheets

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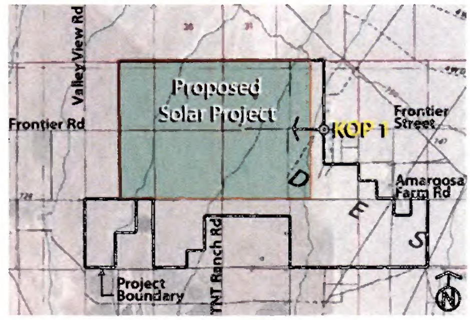
VISUAL CONTRAST RATING WORKSHEET

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

DRAFT

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 1 Sandy Lane	Township 16S	
VRM Class: IV	Range 49E	
	Section 8	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground) Triangular (background)	Low to tall (foreground) Low (mid to background)	Geometric, rectilinear (foreground) linear, Vertical (mid-ground)
Line	Horizontal (foreground) Jagged and diagonal (background)	Regular, vertical (foreground) Regular, horizontal (mid ground)	Vertical (mid-ground)
Color	Tan (foreground) Brown and dark brown (background)	Dark greens and browns	Brown
Texture	Fine (foreground) Coarse (background)	Coarse (foreground) Fine (mid and background)	Fine (background)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat (sf) (foreground)	Geometric from clearing (sf) (foreground)	Linear (tl), linear, rectangular (sf), tall, cylindrical (pb) (foreground)
Line	Horizontal, linear (sf), foreground)	Regular, linear (sf) (foreground)	Linear (sf, tl, fence) vertical (pb) (foreground)
Color	Tan (sf) (foreground)	Green (foreground)	Silver-blue, shiny (sf) tan/brown (pb) (foreground)
Texture	Fine (foreground)	Coarse (foreground)	Fine to medium (foreground/background)

Degree of Contrast

Degree of Contrast		Landform/ Water Body: Strong	Moderate	Weak	None	Vegetation: Strong	Moderate	Weak	None	Structures: Strong	Moderate	Weak	None
Elements	Form			X			X			X			
	Line			X			X			X			
	Color			X				X		X			
	Texture			X			X				X		

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

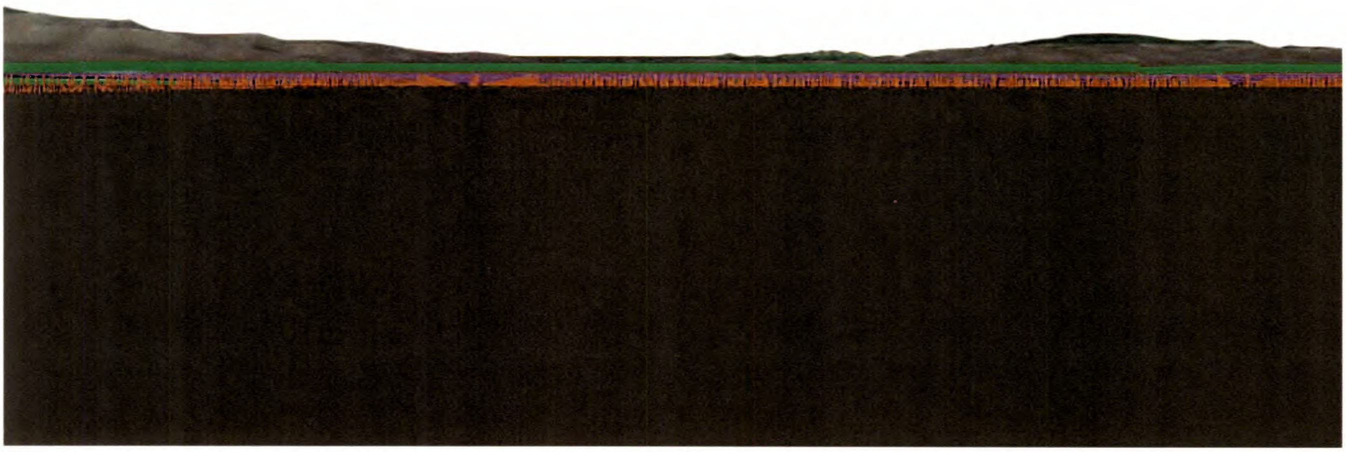
Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

KOP / Simulation 1 – View facing west from Sandy Lane residence

Strong contrast would result from construction and operation of the proposed project with naturalistic project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation with a moderate contrast resulting from vegetation removal. The proposed project structures would be seen from KOP 1 at a distance of approximately 700 feet and would be seen from a level viewing position with the dominant view being of the proposed semi-transparent wind-fence, the first row of solar collectors and potentially the tops of power block components (at a distance of .75 mile). As viewed from KOP 1, the site topography descends towards the southwest helping minimize the impacts of the taller power-block elements such as the cooling tower and the salt storage tanks. Overall impacts are anticipated to be high / moderate.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP / Simulation 1 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

Note: wire frame models are diagrammatic and for orientation purposes only

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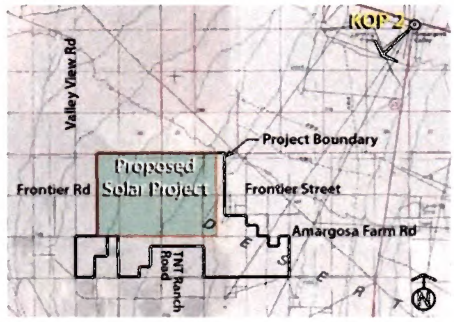
VISUAL CONTRAST RATING WORKSHEET

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

DRAFT

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 2 Lathrop Wells Rest Area	Township 15S Range 50E Section 18	
VRM Class: IV		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Horizontal (foreground) Triangular, Irregular (background)	Low, horizontal (foreground and mid-ground)	Linear, geometric (foreground to mid-ground)
Line	Horizontal (foreground) Undulating (background)	Regular (foreground to background)	Vertical, diagonal (foreground) Horizontal (mid-ground)
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Browns, Dark green (foreground to mid-ground)	Grey, brown (foreground)
Texture	Fine (foreground) Coarse (background)	Fine to (foreground) Fine (mid and background)	Regular, fine (foreground to mid-ground)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Not Visible	Not Visible	Linear (tl), linear, rectangular (sf), tall, cylindrical (pb) (Mid-ground)
Line	Not Visible)	Not Visible	Linear (sf, tl) vertical (pb) (mid-ground)
Color	Not Visible	Not Visible	Silver-blue, shiny (sf) tan/brown (pb) (mid-ground)
Texture	Not Visible	Not Visible	Fine (sf, tl) medium (pb) (mid-ground/background)

Degree of Contrast

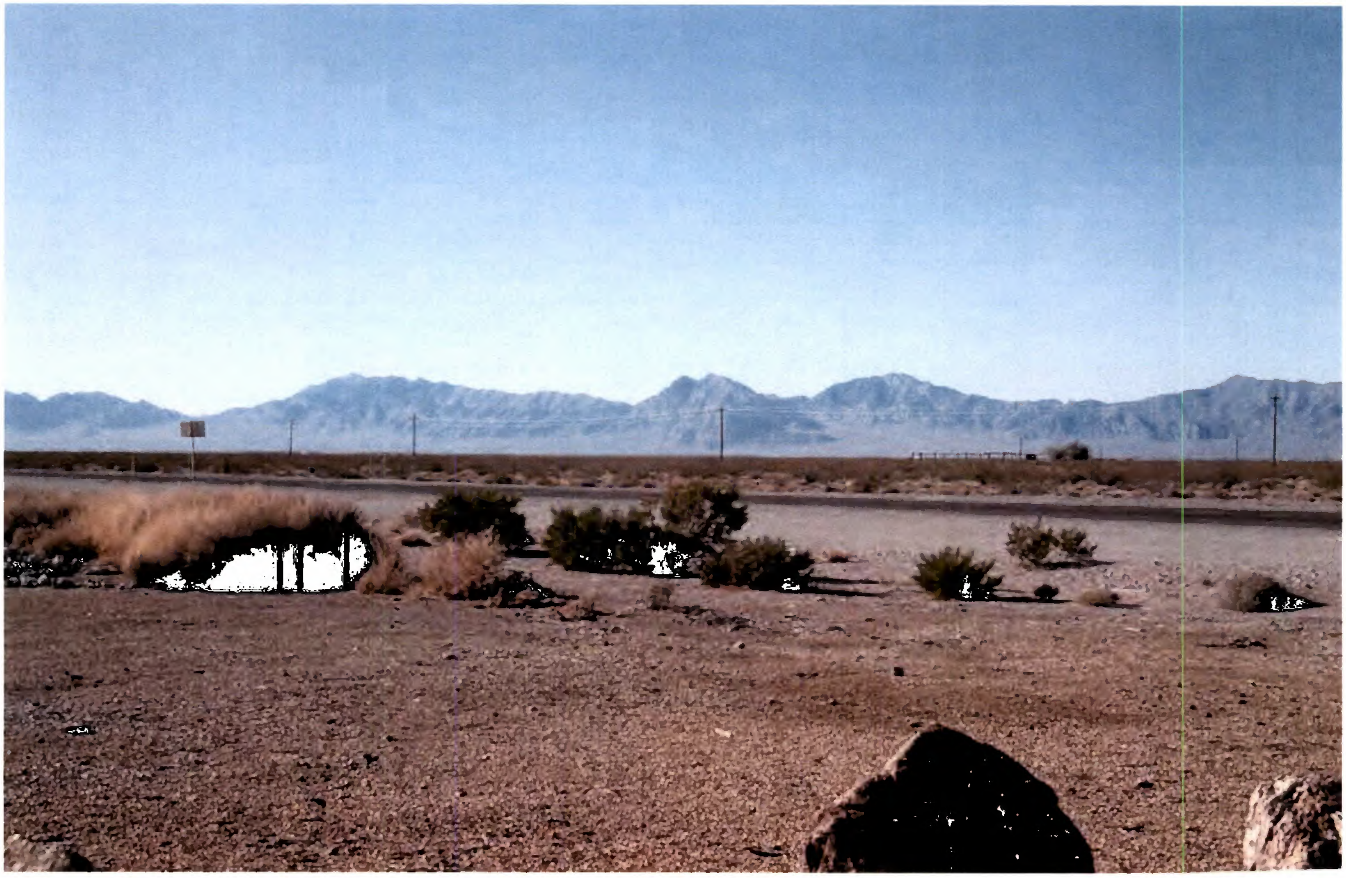
		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form			X					X		X		
	Line				X			X				X	
	Color				X				X			X	
	Texture				X				X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP /Simulation 2 - View facing southwest from Lathrop Wells rest area

Weak contrast would result from construction and operation of the proposed project with modified project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the contrast of modifications to landform and vegetation would be seen from KOP 2. The proposed project powerblock structures (i.e. air-cooling unit and salt-storage tanks) would be seen from KOP 2 at a distance of approximately 6 miles and would be seen from a level viewing position with backdropped views, further reducing the overall perceived impacts. Overall Impacts are anticipated to be weak.

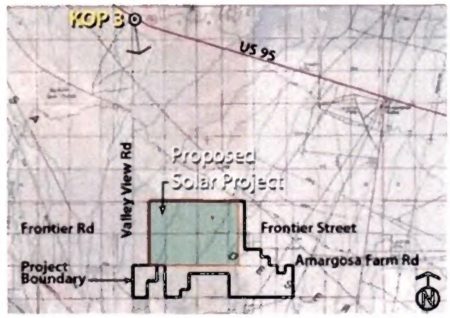
Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP / Simulation 2 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

VISUAL CONTRAST RATING WORKSHEET

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

DRAFT

Project Name: Amargosa Farm Road Solar Project	Location	Location Sketch
Key Observation Point : 3 East Bound US 95	Township 15S	
VRM Class: IV	Range 48E	
	Section 2	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Horizontal (foreground) Triangular, Irregular (background)	Low, horizontal (foreground and mid-ground)	Linear, geometric (foreground to mid-ground)
Line	Horizontal (foreground) Undulating (background)	Regular (foreground to background)	Vertical, diagonal (foreground) Horizontal (mid-ground)
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Browns, green (foreground to background)	Grey, brown (foreground)
Texture	Fine (foreground) Mid to Coarse (background)	Fine (foreground to background)	Regular, fine (foreground to mid-ground)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat, Horizontal (sf) (mid-ground)	Geometric from clearing (sf) (mid-ground)	Linear (tl), linear, rectangular (sf), tall, cylindrical (pb) (mid-ground)
Line	Horizontal, linear (sf), (mid-ground)	Regular, linear (sf) (mid-ground)	Linear (sf, tl) vertical and rectangular (pb) (mid-ground)
Color	Not Visible	Green/brown (mid-ground)	Silver-blue, shiny (sf) tan/brown (pb) (mid-ground)
Texture	Not Visible	Fine (mid-ground)	Fine (sf, tl) medium (pb) (mid-ground/background)

Degree of Contrast

Degree of Contrast		Features											
		Landform/ Water Body				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form			X			X				X		
	Line			X				X			X		
	Color			X				X			X		
	Texture			X				X				X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
Refer to Chapter 4 – Mitigation Measures

Evaluators Names:
Conrad Langley, Marc Schwartz

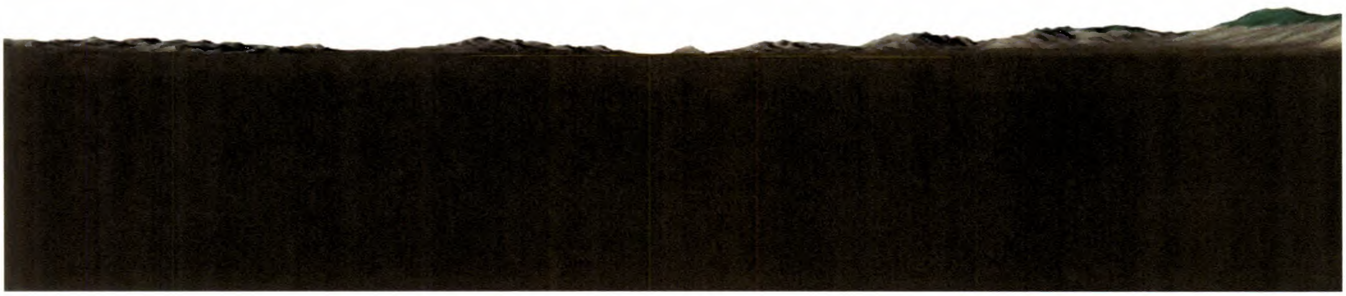
Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP / Simulation 3 – View facing south from US95

Weak/Moderate contrast would result from construction and operation of the proposed project with a naturalistic project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the contrast of modifications to landform and vegetation will result in increased project contrast from this KOP. The proposed project structures would be seen from KOP 3 at a distance of approximately 5 ½ miles and would be seen from a level viewing position. Project components expected to be seen are the powerblock (i.e. Air cooling unit, salt storage tanks) that are rectangular and geometric in form and hard-edged lines. Transmission poles would be evident in areas where there is no backdropping. The solar troughs would be seen as a thin low, continuous line that sits on the horizon line. Due to the atmospheric conditions and reflectivity of the solar troughs, the linear nature of the solar troughs blends with the partially backdropped views, further reducing the overall perceived impacts. Overall impacts are anticipated to be moderate/low.

For the duration of construction, a temporary construction access road would be built from US 95 to the northern project boundary. During this construction phase, overall contrast would raise to a moderate impact due to the low partially blocked nature of the construction road. Post-construction restoration efforts are anticipated to revert the site conditions to a more natural state.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP / Simulation 3 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

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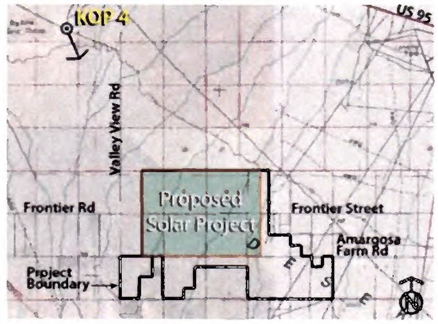
VISUAL CONTRAST RATING WORKSHEET

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

DRAFT

Project Name:	**Location**	Location Sketch
Amargosa Farm Road Solar Project	Township 15S	
Key Observation Point : 4 Big Dune	Range 48E	
VRM Class: IV	Section 16	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Horizontal (foreground) Irregular (background)	Low, horizontal (foreground and mid-ground)	N/A
Line	Horizontal (foreground) Undulating (background)	Regular (foreground to background)	N/A
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Brown/Dark green (mid-ground)	N/A
Texture	Fine (foreground) Coarse (background)	Patchy, Coarse (foreground) Fine (mid and background)	N/A

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat, Horizontal (sf) (mid-ground)	Geometric from clearing (sf) (mid-ground)	Linear (tl), linear, rectangular (sf), tall, cylindrical (pb) (mid-ground)
Line	Horizontal, linear (sf), (mid-ground)	Regular, linear (sf) (mid-ground)	Linear (sf, tl) vertical (pb) (mid-ground)
Color	Not Visible	Green/brown (mid-ground)	Silver-blue, shiny (sf) tan/brown (pb) (mid-ground)
Texture	Not Visible	Fine (mid-ground)	Fine (sf, tl) medium (pb) (mid-ground/background)

Degree of Contrast

Degree of Contrast	Features: Landform/ Water Body				Vegetation				Structures			
Elements	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				X			X			X		
Line				X			X			X		
Color				X				X			X	
Texture				X				X			X	

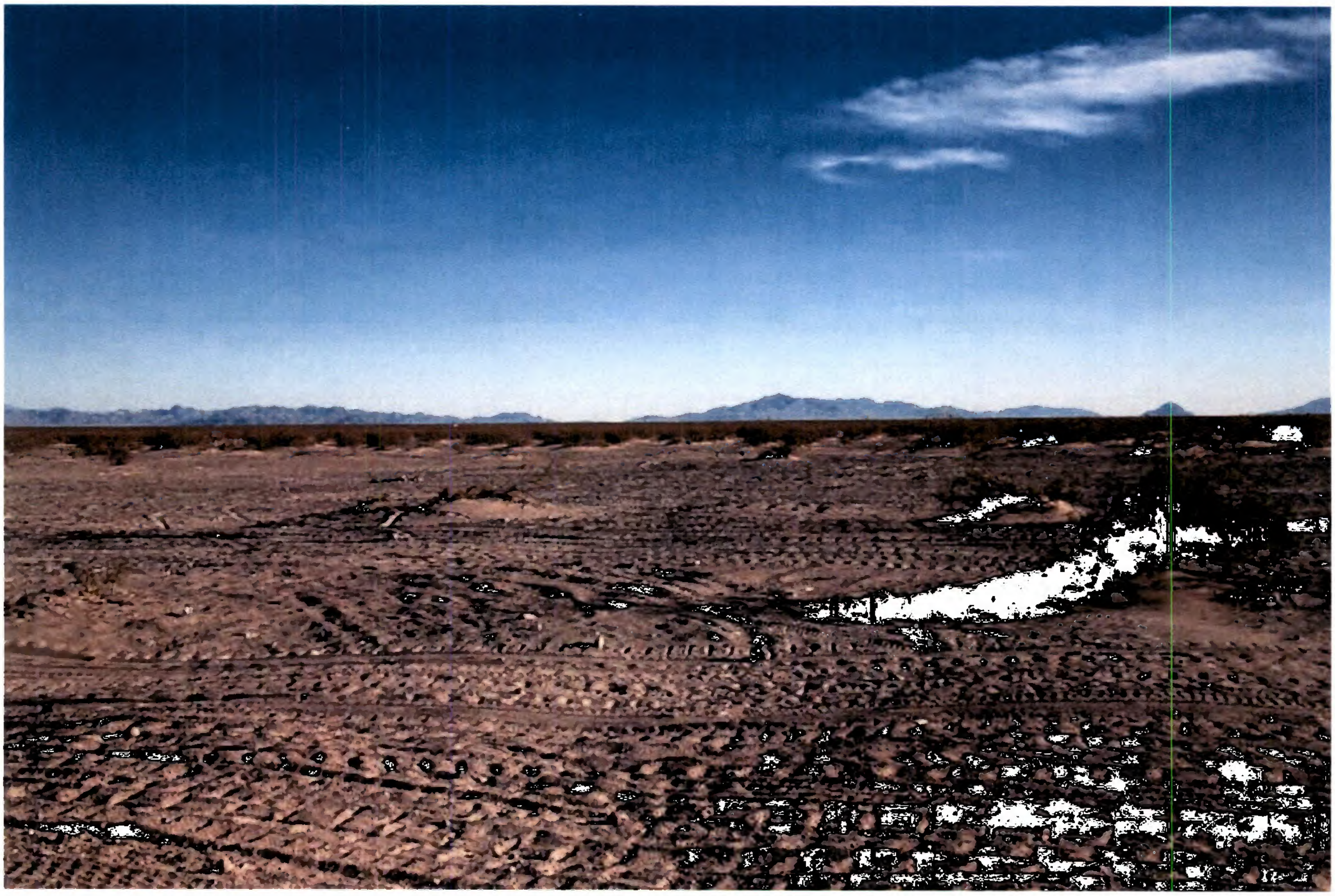
Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

S:\EPG\projects\Solar Millennium\D_Project Work\D4_Visual Resources\Technical Reports\KOPs\Amargosa KOP4 - Visual Contrast Rating Worksheet.docx\Amargosa KOP4.doc

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP / Simulation 4 – view facing southeast from Big Dune Recreation Area

Weak / Moderate contrast would result from the construction and operation of the proposed project within a naturalistic setting. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the contrast of modifications to landform and vegetation would be seen from KOP 4. The proposed project structures will be seen from KOP 4 at a distance of approximately 3.75 miles and would be seen from a level viewing position, further reducing the overall perceived impacts. Project components expected to be seen are the powerblock (i.e. Air cooling unit, salt storage tanks) that are rectangular and geometric in form and hard-edged lines. Transmission poles would be seen as regular, repeating vertical elements between the powerblocks and proposed switchyard, which is unlikely to be seen. The solar troughs would be seen as a thin low, continuous line that sits on the horizon line. Due to the atmospheric conditions and reflectivity of the solar troughs, the linear nature of the solar troughs blends with the partially backdropped views, further reducing the overall perceived impacts. Overall impacts are anticipated to be moderate/low.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP / Simulation 4 – Wire-frame model of solar fields and project-block elements (does not account for vegetative screening)

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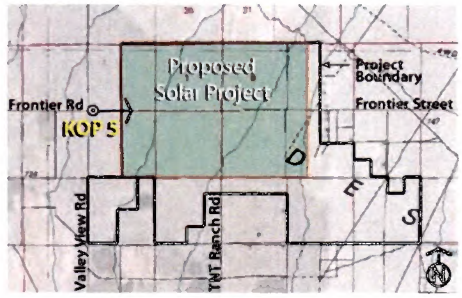
VISUAL CONTRAST RATING WORKSHEET

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

DRAFT

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 5 Valley View Road	Township 16S	
VRM Class: IV	Range 49E	
	Section 11	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, Horizontal (foreground) Irregular (background)	Low, horizontal (foreground and mid-ground)	Linear, Vertical (poles)
Line	Horizontal (foreground) Undulating (background)	Regular (foreground to background)	vertical
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Brown/Dark green (mid-ground)	brown
Texture	Fine (foreground and mid-ground) Coarse (background)	Patchy, Coarse (foreground) Fine (mid and background)	Fine, regular

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat, Horizontal (sf)	Geometric from clearing (sf) (foreground)	Linear (tl), linear, rectangular (sf), tall, geometric, rectangular, (pb) (foreground)
Line	Horizontal, linear (sf)	Regular, linear (sf)	Linear (sf, tl, fence) vertical (pb) (foreground)
Color	Light brown	Green/brown	Silver-blue, shiny (sf) tan/brown (pb) (foreground)
Texture	Fine	Fine	Fine (sf, tl) medium (pb) (foreground to background)

Degree of Contrast

Degree of Contrast		Features											
		Landform/ Water Body				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form	X				X				X			
	Line	X					X			X			
	Color		X				X			X			
	Texture		X				X				X		

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

KOP / Simulation 5 – View facing west from Valley View Estates

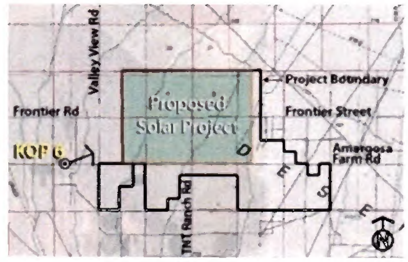
Strong contrast would result from construction and operation of the proposed project with naturalistic project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation with moderate contrast resulting from vegetation removal. The proposed project structures would be seen from KOP 5 at a distance of a 1/4 mile and would be seen from a level viewing position with the dominant view being of the proposed semi-transparent wind-fence, the first row of solar collectors and the upper parts of the power block components (at a distance of .75 miles). Overall impacts are anticipated to be high / moderate.

KOP / Simulation 5 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

VISUAL CONTRAST RATING WORKSHEET

District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

DRAFT

Project Name: Amargosa Farm Road Solar Project	Location	Location Sketch
Key Observation Point : 6 Amargosa Farm Road	Township 16S Range 48E Section 15	
VRM Class: IV		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground) Irregular (background)	Low, horizontal (foreground and mid-ground)	Linear, narrow, vertical (poles)
Line	Horizontal (foreground) Undulating, jagged (background)	Regular (foreground to background)	vertical
Color	Tan (foreground and mid-ground) Dark Brown/brown, tan (background)	Green, Pale yellow (foreground) Brown/Dark green (mid-ground)	brown
Texture	Fine (foreground and mid-ground) Coarse (background)	Patchy, Coarse (foreground) Fine (mid and background)	Fine, regular

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat, Horizontal (sf) (mid-ground)	Geometric from clearing (sf) (mid-ground)	Linear, rectangular (sf) (foreground), Linear (tl), tall, geometric, cylindrical (pb) (mid-ground)
Line	Horizontal, linear (sf), (mid-ground)	Regular, linear (sf) (mid-ground)	Linear, horizontal (sf, tl, fence), rectangular, vertical (pb) (foreground)
Color	Light brown	Green/brown (mid-ground)	Silver-blue, shiny (sf) tan/brown (pb) (foreground)
Texture	Fine	Fine (mid-ground)	Fine (sf, tl) medium (pb) (foreground to background)

Degree of Contrast

Degree of Contrast		Landform/ Water Body				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X		X			X			
	Line				X		X			X			
	Color			X				X		X			
	Texture			X				X			X		

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

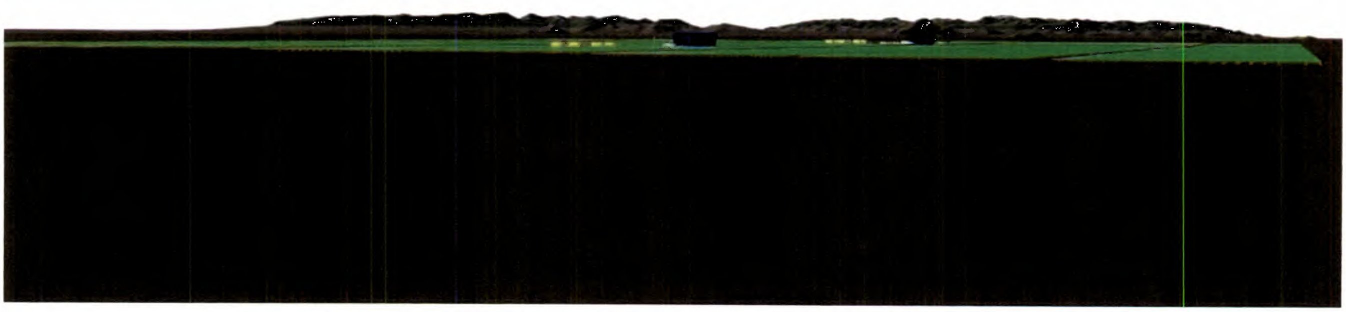
Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

KOP 6 – view facing east-northeast from Amargosa Farm Road

Strong contrast would result from construction and operation of the proposed project with naturalistic/pastoral project setting designated as VRM Class IV. The construction of the project will result in substantial grading and the clearing of vegetation with a moderate contrast evident from this KOP. The proposed project structures would be seen from KOP 6 at a distance of approximately 1.25 miles and would be seen from a level viewing position with the dominant view being of the proposed project fence, the first row of solar collectors, and tops of power block components.

The 250 foot Amargosa Farm Road realignment would be most evident from this KOP with project components (assembly hall, switchyard, administrative building, and drainage/detention structures) being situated on the south side of the re-aligned road. Dense vegetative screening from the residential areas would reduce perceived impacts to proposed facilities located on the south side of Amargosa Farm Road. These project components would increase the project contrast, thus increasing the overall impacts for travelers as they move west to east towards the project. Overall impacts are anticipated to be moderate/high.

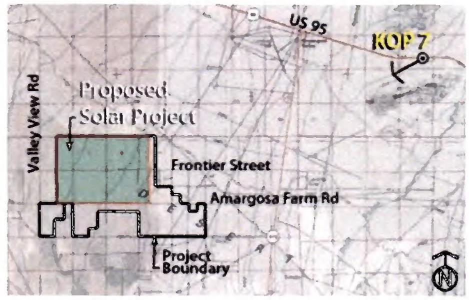


KOP 6 – Wire-frame model of solar fields and powerblock project elements (does not account for any vegetative screening or wind fence screening)

VISUAL CONTRAST RATING WORKSHEET

DRAFT

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 7 West Bound 95	Township 15S	
VRM Class: IV	Range 50E	
	Section 22	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Horizontal (foreground) Triangular, Irregular (background)	Low, horizontal (foreground and mid-ground)	Linear, geometric (foreground to mid-ground)
Line	Horizontal (foreground) Undulating, irregular (background)	Regular (foreground to background)	Diagonal (foreground to Mid-ground)
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Browns, green, reddish-browns (foreground to background)	Grey (foreground)
Texture	Fine (foreground) Mid to Coarse (background)	Fine (foreground to background)	Regular, fine (foreground to mid-ground)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat, Horizontal (sf) (Mid-ground)	Geometric from clearing (sf) (background)	Linear (tl), linear, rectangular (sf), geometric (pb) (background)
Line	Horizontal, linear (sf), (Mid-ground)	Regular, linear (sf) (background)	Linear (sf, tl) vertical (pb) (background)
Color	Not Visible	Green/brown, reddish brown (background)	Silver-blue, shiny (sf) tan/brown (pb) (background)
Texture	Not Visible	Fine (background)	Fine (sf, tl) medium (pb) (Mid-ground/background)

Degree of Contrast

Degree of Contrast		Landform/ Water Body: Strong	Moderate	Weak	None	Vegetation: Strong	Moderate	Weak	None	Structures: Strong	Moderate	Weak	None
Elements	Form				X				X			X	
	Line				X				X			X	
	Color				X				X			X	
	Texture				X				X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP 7 – View facing west-southwest from US95

Weak contrast would result from construction and operation of the proposed project with a naturalistic project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the contrast of modifications to landform and vegetation would be seen from this KOP. The proposed project structures would be seen from KOP 7 at a distance of approximately 8 ½ miles and would be seen from a level viewing position with backdropped views, further reducing the overall perceived impacts. Overall impacts are anticipated to be low.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP 7 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

Note: wire frame models are diagrammatic and for orientation purposes only

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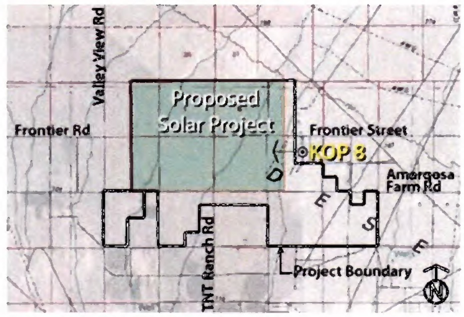
VISUAL CONTRAST RATING WORKSHEET

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

DRAFT

Project Name:	**Location**	Location Sketch
Amargosa Farm Road Solar Project	Township 16S	
Key Observation Point : 8 Atomic Road / Frontier Road	Range 49E	
VRM Class: IV	Section 8	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground) Triangular (background)	Low to tall (foreground) Low (mid to background)	Geometric, rectilinear (foreground) linear, Vertical(mid-ground)
Line	Horizontal (foreground) Undulating (background)	Regular, vertical (foreground) Regular, horizontal (mid ground)	Vertical (mid-ground)
Color	Tan (foreground) Brown and dark brown (background)	Dark greens and browns	Brown
Texture	Fine (foreground) Coarse (background)	Coarse (foreground) Fine (mid and background)	Fine (background)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat (sf) (foreground)	Geometric from clearing (sf) (foreground)	Linear (tl), linear, rectangular (sf), tall, geometric, cylindrical (pb) (foreground)
Line	Horizontal, linear (sf), foreground)	Regular, linear (sf) (foreground)	Linear (sf, tl, fence) vertical (pb) (foreground)
Color	Tan (sf) (foreground)	Green (foreground)	Silver-blue, shiny (sf) tan/brown (pb) (foreground)
Texture	Fine (foreground)	Coarse (foreground)	Fine to medium (foreground/background)

Degree of Contrast

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X		X			X			
	Line				X		X			X			
	Color			X				X		X			
	Texture			X			X				X		

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

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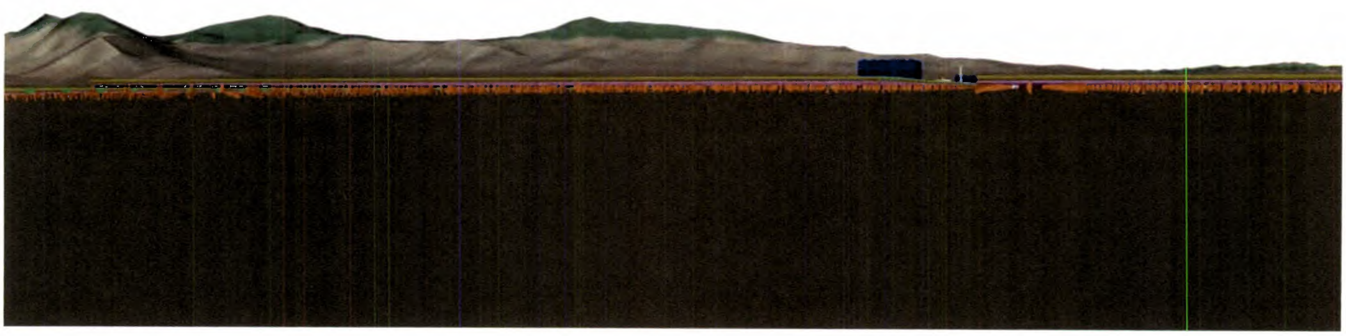
Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP 8 – View facing west from Atomic Road

Moderate / strong contrast would result from construction and operation of the proposed project with naturalistic project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, with a moderate/weak contrast of the vegetation removal and grading from this vantage point. The proposed project structures would be seen from KOP 8 at a distance of approximately ¼ mile and would be seen from a level viewing position with the dominant view being of the proposed project fence and potentially the first row of solar collectors and tops of power block components. Dense vegetative screening from the nearby residential areas mute or obscure some direct views and would further reduce the overall perceived impacts. Overall impacts are anticipated to range from low to moderate, to high.

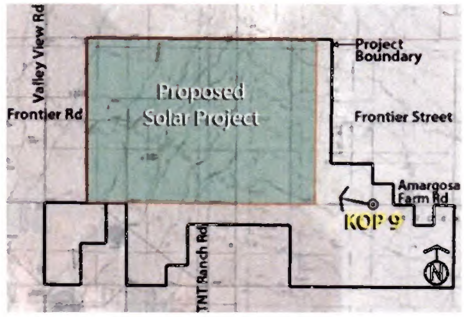


KOP 8 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

VISUAL CONTRAST RATING WORKSHEET

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

DRAFT

Project Name:	Location	Location Sketch
Amargosa Farm Road Solar Project	Township 16S	
Key Observation Point : 9 Amargosa Farm Road	Range 49E	
VRM Class: IV	Section 9	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground and mid-ground) Irregular (background)	Low, horizontal (foreground and mid-ground) Vertical, pyramidal (mid-ground)	Linear, vertical (poles) Linear, narrow (road)
Line	Horizontal (foreground and mid-ground) Undulating, diagonal (background)	Regular (foreground to background) Vertical (mid-ground)	Vertical (poles) Straight, horizontal (road)
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Brown/green (foreground) Brown, green, dark green (mid-ground)	Brown (poles) Dark grey (road)
Texture	Fine (foreground and mid-ground) Coarse (background)	Patchy, coarse (foreground) Fine (mid and background)	Fine, regular (poles) Fine, continuous (road)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat, Horizontal (sf) (foreground)	Geometric from clearing (sf, pb road alignment) (foreground)	Linear (tl), linear, rectangular (sf), tall, geometric, cylindrical (pb) (foreground)
Line	Horizontal, linear (sf), (foreground)	Regular, linear (sf) (foreground)	Linear (sf, tl, fence) vertical, geometric (pb) (foreground)
Color	Tan	Brown/green (foreground)	Silver-blue, shiny (sf) tan/brown (pb) (foreground)
Texture	Fine	Patchy, course (foreground)	Fine (sf, tl) medium (pb) (foreground to background)

Degree of Contrast

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form			X			X			X			
	Line			X			X			X			
	Color		X				X			X			
	Texture			X			X			X			

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

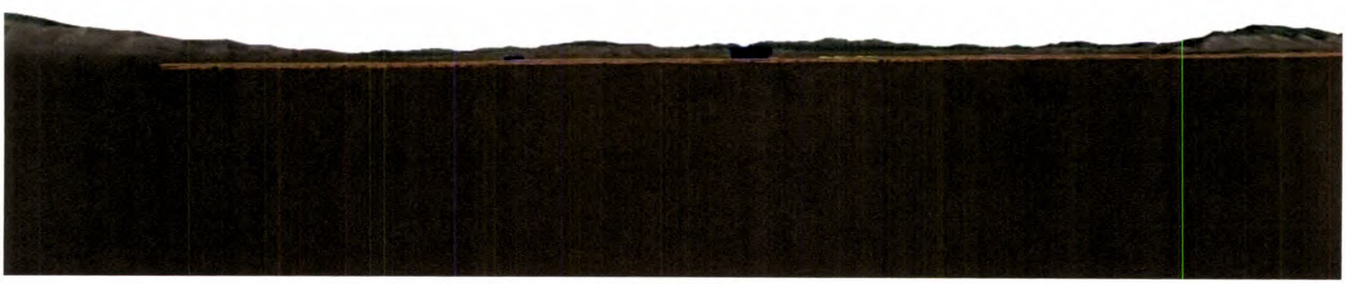
Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP 9 – View facing northwest from Amargosa Farm Road

Moderate / strong contrast would result from construction and operation of the proposed project with slightly modified project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation with a high/moderate contrast of these elements from this KOP. The proposed project structures would be seen from KOP 9 at a distance of approximately ¾ of a mile and would be seen from a level viewing position with the dominant view being of the proposed project fence, solar collectors and tops of power block components.

The 250 foot Amargosa Farm Road realignment would be most evident from this KOP with project components (assembly hall, switchyard, administrative building, and drainage/detention structures) being situated on the south side of the re-aligned road. These project components would increase the project contrast, thus increasing the overall impacts for travelers as they move west to east towards the project. Overall impacts are anticipated to be moderate / high.

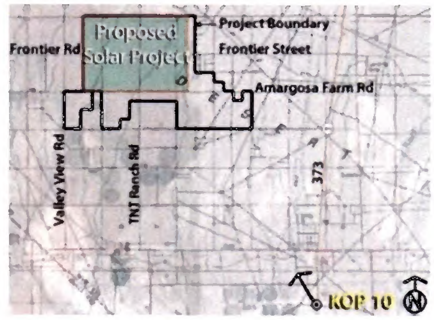


KOP 9 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

VISUAL CONTRAST RATING WORKSHEET

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

DRAFT

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 10 Northbound NV 373	Township 17S Range 49E Section 11	
VRM Class: IV		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground and mid-ground) Undulating (background)	Low, horizontal (foreground) Low, horizontal; vertical, rounded (mid-ground)	Linear, narrow (foreground to mid-ground) Geometric (mid-ground)
Line	Horizontal (foreground and mid-ground) Undulating (background)	Regular (foreground) Regular; low, vertical (mid-ground)	Straight, horizontal (foreground to mid ground) Simple, geometric (mid-ground)
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Browns, green (foreground and mid-ground)	Grey (foreground to mid-ground) White (mid-ground)
Texture	Fine (foreground) Medium to coarse (background)	Fine (foreground) Medium to coarse (background)	Fine, continuous (foreground to mid-ground) Medium (mid-ground)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Not Visible	Geometric from clearing (sf, pb) (background)	Linear (tl), linear, rectangular (sf), tall, cylindrical (pb) (background)
Line	Not Visible	Regular, linear (sf, pb) (background)	Linear (sf, tl) vertical (pb) (background)
Color	Not Visible	Browns, green (background)	Silver-blue, shiny (sf) tan/brown (pb) (background)
Texture	Not Visible	Fine (background)	Fine (sf, tl, pb) (background)

Degree of Contrast

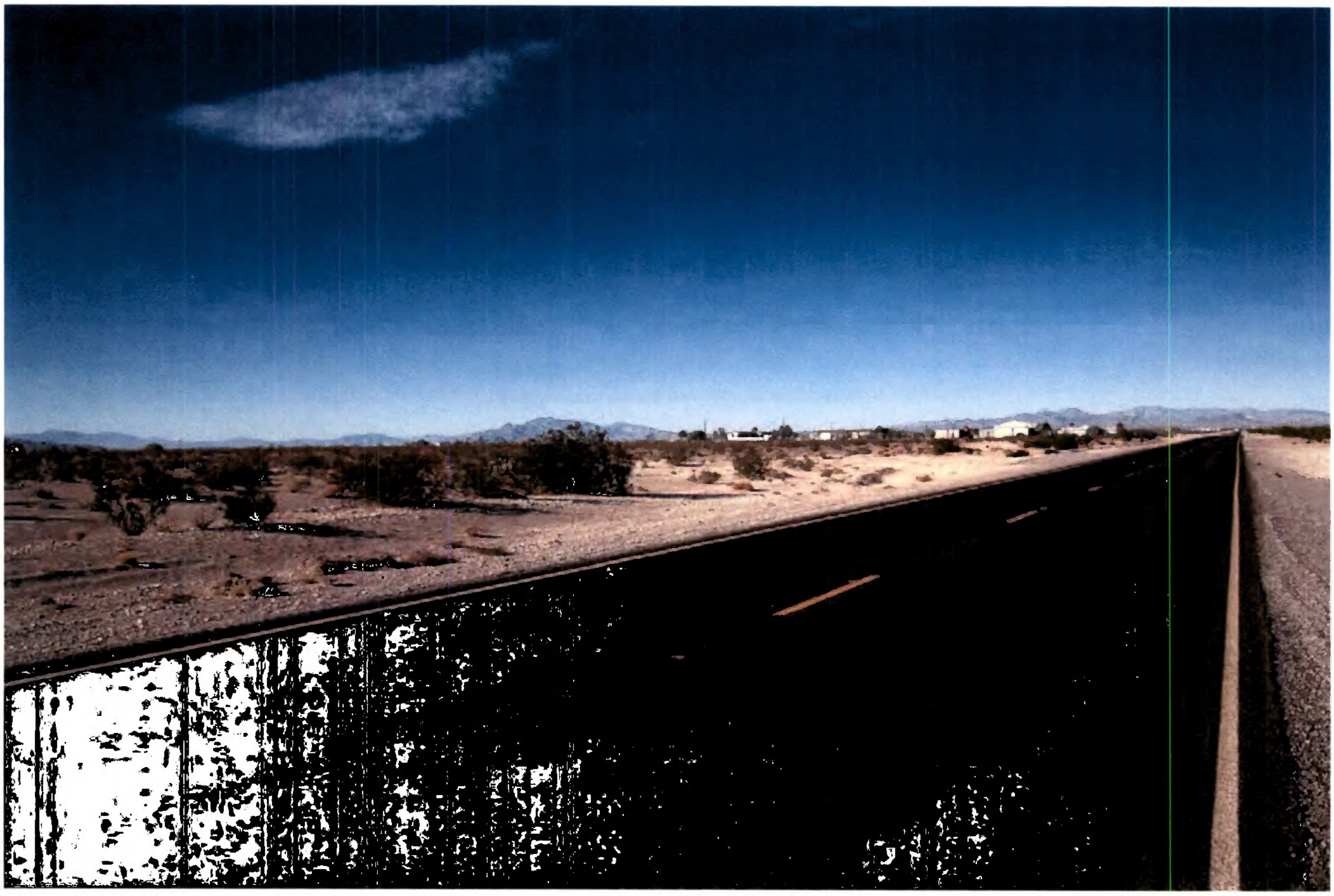
		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X			X	
	Line				X				X			X	
	Color				X				X			X	
	Texture				X				X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

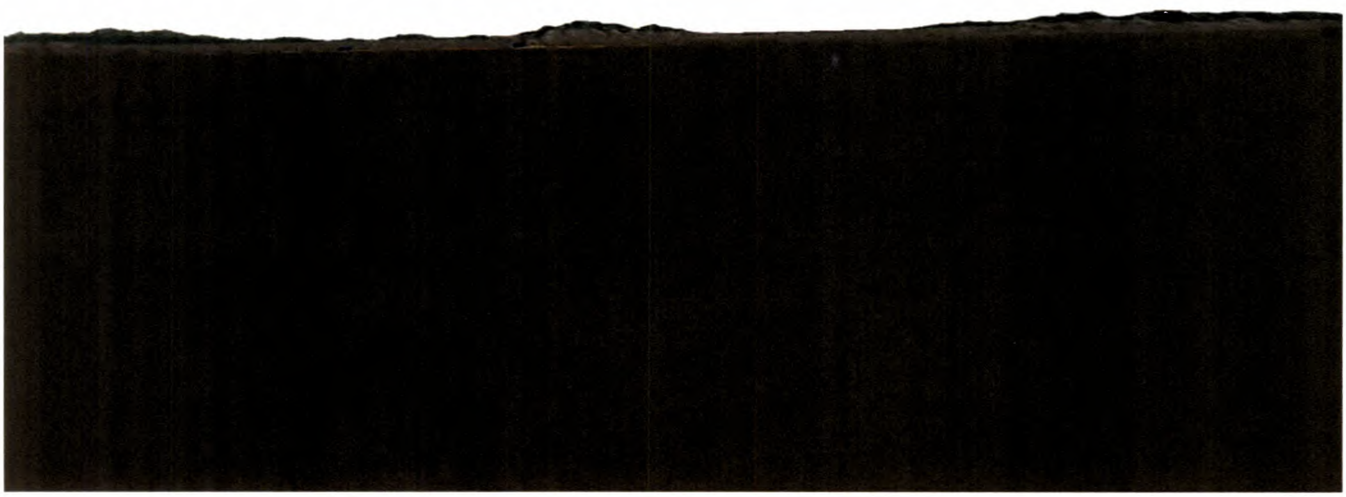
Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	



KOP 10 – view facing north-northwest from NV 373

Weak contrast would result from construction and operation of the proposed project with modified project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the contrast of modifications to landform and vegetation will be seen from this KOP. The proposed project structures would be seen from KOP 10 at a distance of approximately 5 ½ miles and would be seen from a level viewing position with backdropped views. Existing natural vegetation and vegetative screening from residential areas further reduce the overall perceived impacts. Overall impacts are anticipated to be low.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP 10 – Wire-frame model of solar fields and powerblock project elements (does not account for any vegetative screening or wind fence screening)

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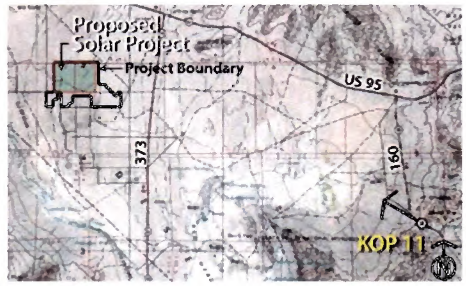
Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

DRAFT

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 11 NV 160	Township 27N Range 52E Section 26	
VRM Class: IV		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground) Irregular (background)	Low, horizontal (foreground and mid-ground)	Linear, vertical (poles) Linear, narrow (road)
Line	Horizontal (foreground) Undulating (background)	Regular (foreground to background)	Vertical (poles) Straight, horizontal (road)
Color	Tan, light tan (foreground and mid-ground) Dark Brown/brown (background)	Browns, green (foreground to background)	Light brown (poles) Dark grey (road)
Texture	Fine (foreground and mid-ground) Coarse (background)	Fine (foreground to background)	Fine, regular (poles) Fine, continuous (road)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Not Visible	Not Visible	Linear, geometric
Line	Not Visible	Not Visible	Linear
Color	Not Visible	Not Visible	Blue/Silver
Texture	Not Visible	Not Visible	Fine

Degree of Contrast

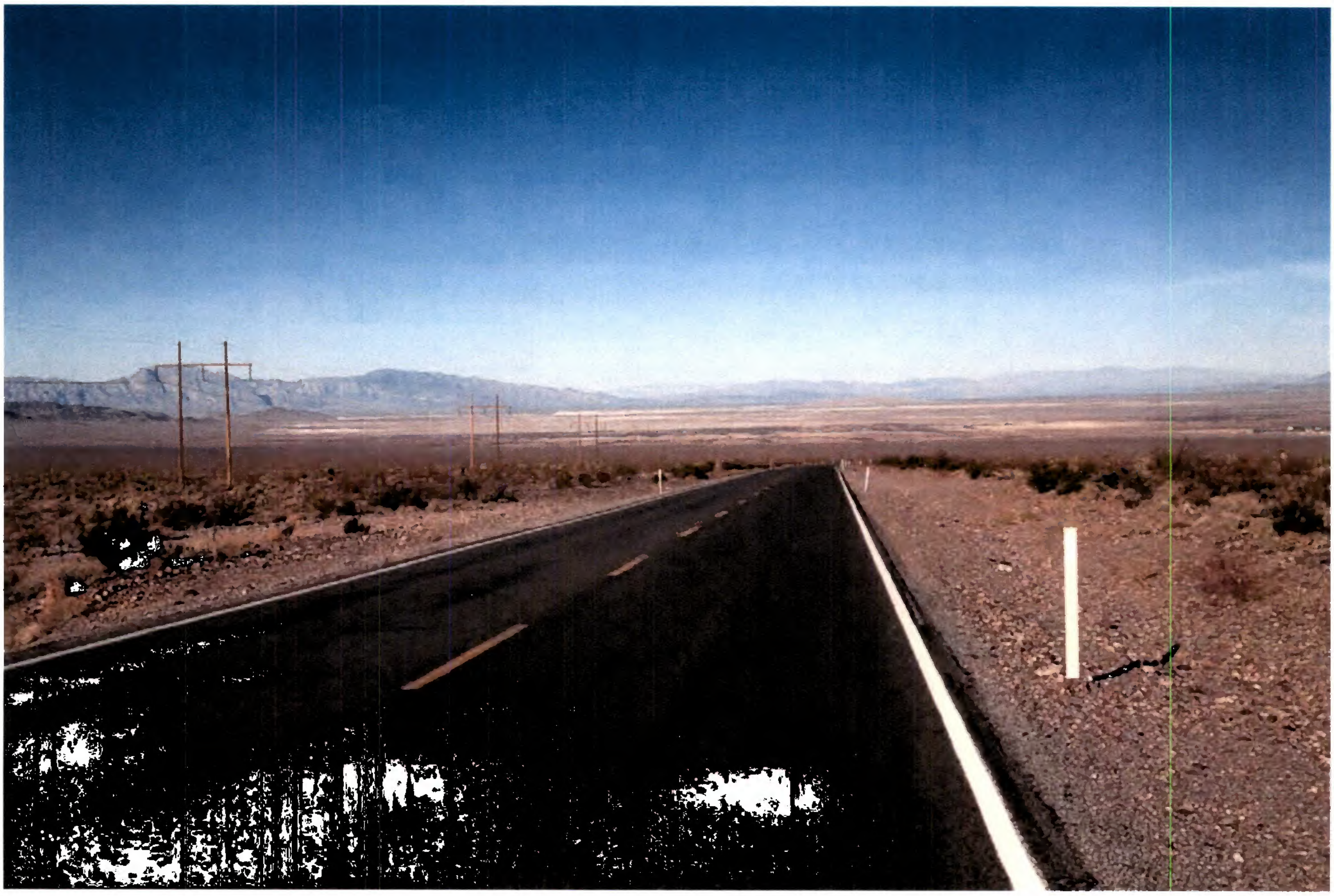
Degree of Contrast		Features											
		Landform/ Water Body				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X				X
	Line				X				X			X	
	Color				X				X			X	
	Texture				X				X				X

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

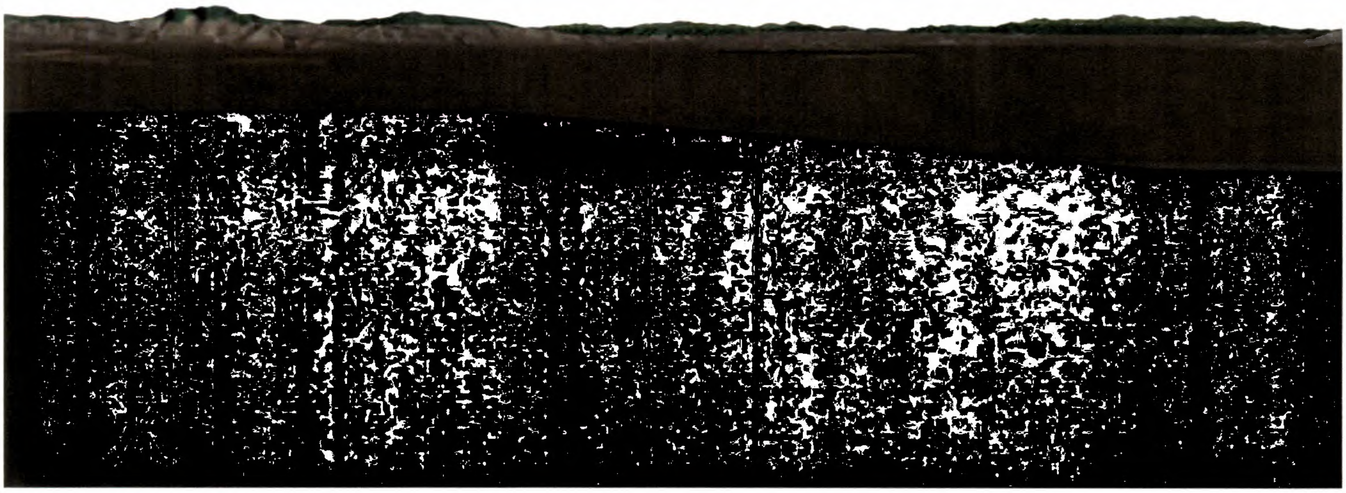
Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP 11 – view facing west from SR 160

Weak contrast would result from construction and operation of the proposed project with a naturalistic setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the contrast of modifications to landform and vegetation would be seen from this KOP. The proposed project structures will be seen from KOP 11 at a distance of 21 ½ miles and would be seen from a superior viewing position as travelers along NV 160 head down into the valley. Structures would be visible to travelers from this viewing position; however, the distance from the proposed project coupled with backdropped views, would reduce the overall perceived impacts. Overall impacts are anticipated to be low.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP 11 – Wire-frame model of solar fields and powerblock project elements (does not account for any vegetative screening or wind fence screening)

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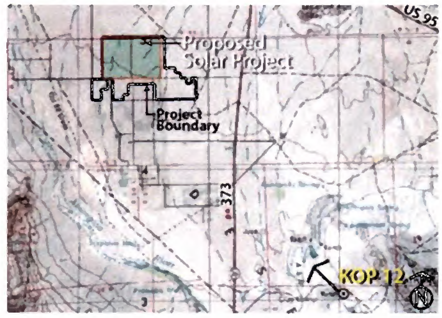
VISUAL CONTRAST RATING WORKSHEET

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

DRAFT

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 12 Ash Meadows – Crystal Springs boardwalk	Township 18S	
VRM Class: IV	Range 50E	
	Section 3	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	horizontal (foreground to background)	Low to tall (foreground) Low (mid to background)	Geometric (foreground)
Line	Linear, Horizontal (foreground) Undulating (background)	Irregular (foreground) Regular, horizontal (mid-ground to background)	Diagonals (mid-ground)
Color	White, Tans (foreground) Brown and dark brown (background)	Dark greens and browns	Brown
Texture	Fine (foreground to background)	fine (foreground), coarse and patchy (mid-ground) Fine (background)	Coarse (foreground) Fine (background)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Not Visible	Not Visible	Geometric, linear
Line	Not Visible	Not Visible	Low, Linear
Color	Not Visible	Not Visible	Blue/Silver
Texture	Not Visible	Not Visible	Fine

Degree of Contrast

	Features											
	Landform/ Water Body				Vegetation				Structures			
Degree of Contrast	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements: Form				X				X				X
Elements: Line				X				X				X
Elements: Color				X				X				X
Elements: Texture				X				X				X

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP 12 – view facing northwest from Crystal Springs boardwalk, Ash Meadows

Weak contrast would result from construction and operation of the proposed project with a naturalistic setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the contrast of modifications to landform and vegetation would be seen from this KOP. The proposed project structures would likely be not seen from KOP 12 given that the proposed project will be at a distance of 12 ½ miles and would be seen from a level viewing position, further reducing the overall perceived impacts. Overall impacts are anticipated to be low.

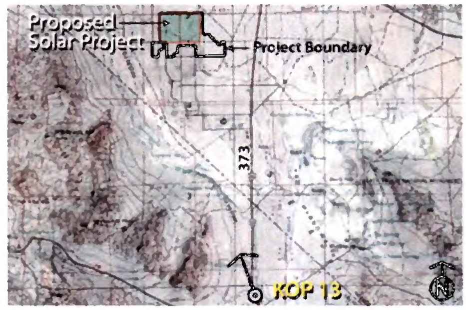
KOP 12 – Wire-frame model of solar fields and powerblock project elements (does not account for any vegetative screening or wind fence screening)

epg

VISUAL CONTRAST RATING WORKSHEET

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

DRAFT

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 13 Northbound CA127 – Death Valley Junction	Township 25N	
VRM Class: IV	Range 5E Section 11	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground) Triangular, irregular (background)	Low, horizontal (foreground and mid-ground)	Linear, vertical (poles) Linear, narrow (road)
Line	Horizontal (foreground) Undulating, diagonal, irregular (background)	Regular (foreground to background)	Vertical (poles) Straight, horizontal (road)
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Browns, green, pale yellow (foreground to background)	Brown (poles) Dark grey (road)
Texture	Fine (foreground) Fine to Coarse (background)	Fine (foreground to background)	Fine, regular (poles) Fine, continuous (road)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Not Visible	Not Visible	Linear, rectangular (sf), tall, cylindrical (pb) (background)
Line	Not Visible	Not Visible	Linear (sf) vertical (pb) (background)
Color	Not Visible	Not Visible	Silver-blue, shiny (sf) tan/brown (pb) (background)
Texture	Not Visible	Not Visible	Fine (sf, pb) (background)

Degree of Contrast

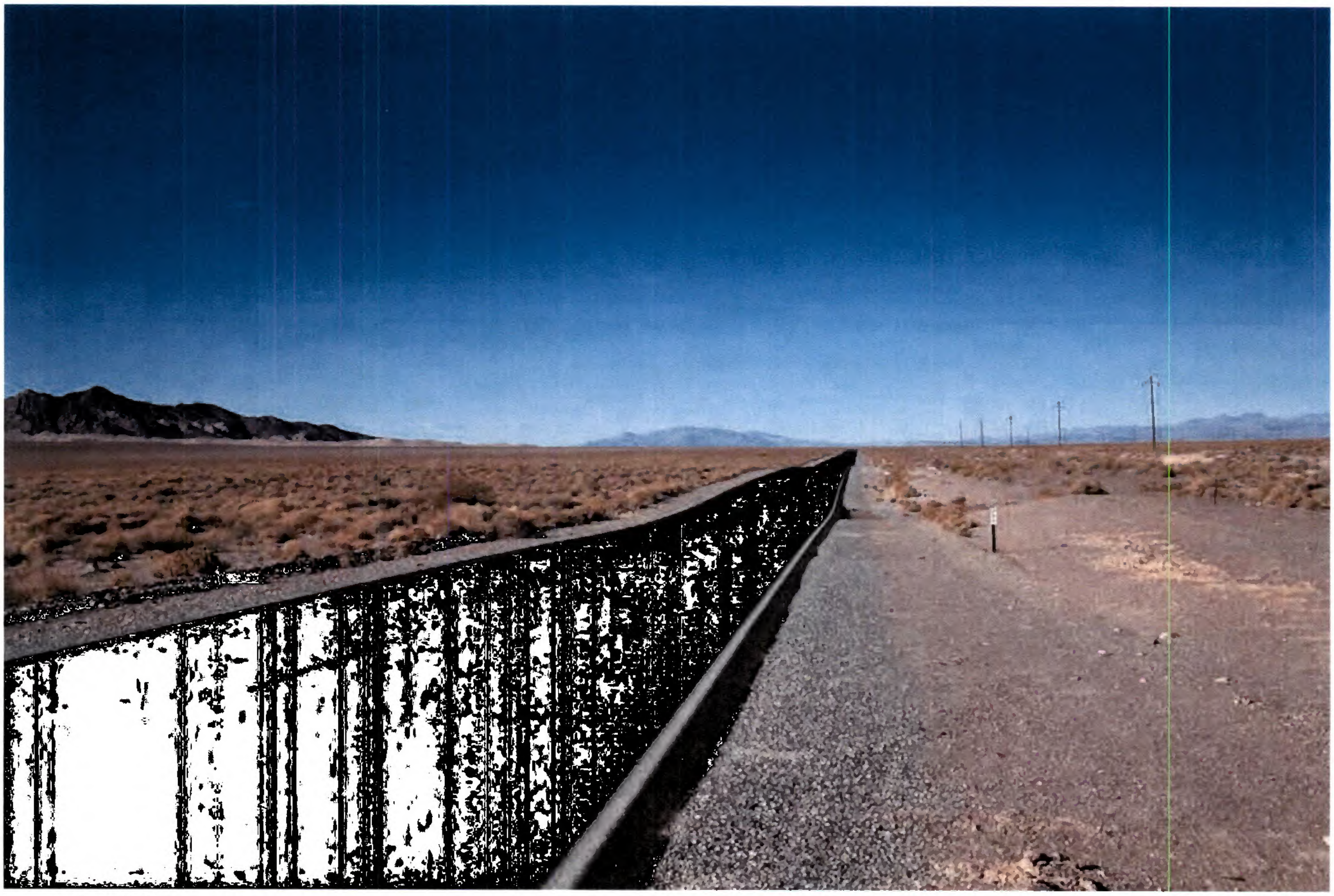
Degree of Contrast		Features: Landform/ Water Body				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X				X
	Line				X				X				X
	Color				X				X				X
	Texture				X				X				X

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP 13 – view facing north-northwest from NV373/CA127, north of Death Valley Junction

Weak contrast would result from construction and operation of the proposed project within a naturalistic project setting designated as VRM Class IV. The construction of the project will result in substantial grading and the clearing of vegetation, but is unlikely that the modifications to landform and vegetation would be seen from this KOP. The proposed project powerblocks would likely be seen from KOP 13 at a distance of approximately 17 miles and would be seen from a level viewing position, but atmospheric conditions would further reduce the overall perceived impacts with changes in topography further decreasing the possibility of overall perceived impacts. Overall impacts are anticipated to be low.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP 13 – Wire-frame model of solar fields and powerblock project elements (does not account for any vegetative screening or wind fence screening)

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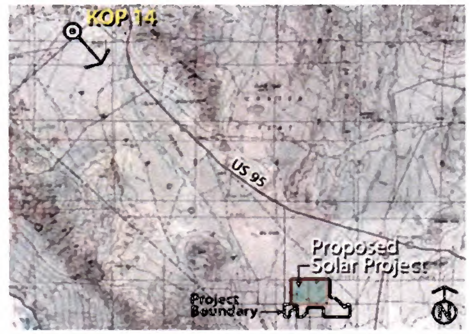
Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

DRAFT

Project Name: Amargosa Farm Road Solar Project	**Location**	Location Sketch
Key Observation Point : 14 Rhyolite cemetery	Township 12S	
VRM Class: IV	Range 46E	
	Section 21	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Horizontal, flat (foreground) Triangular, Irregular (background)	Low, horizontal (foreground and mid-ground)	Low, geometric (foreground)
Line	Horizontal (foreground) Undulating, jagged (background)	Regular (foreground to background)	Straight, horizontal and vertical (foreground)
Color	Tan (foreground and mid-ground) Dark Brown/brown (background)	Browns, green (foreground to background)	Brown (foreground)
Texture	Fine (foreground) Medium to Coarse (background)	Patchy, course (foreground) Fine (mid-ground to background)	Fine (foreground)

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Not Visible	Not Visible	Linear, geometric
Line	Not Visible	Not Visible	Low, linear
Color	Not Visible	Not Visible	Blue, Silver
Texture	Not Visible	Not Visible	Fine

Degree of Contrast

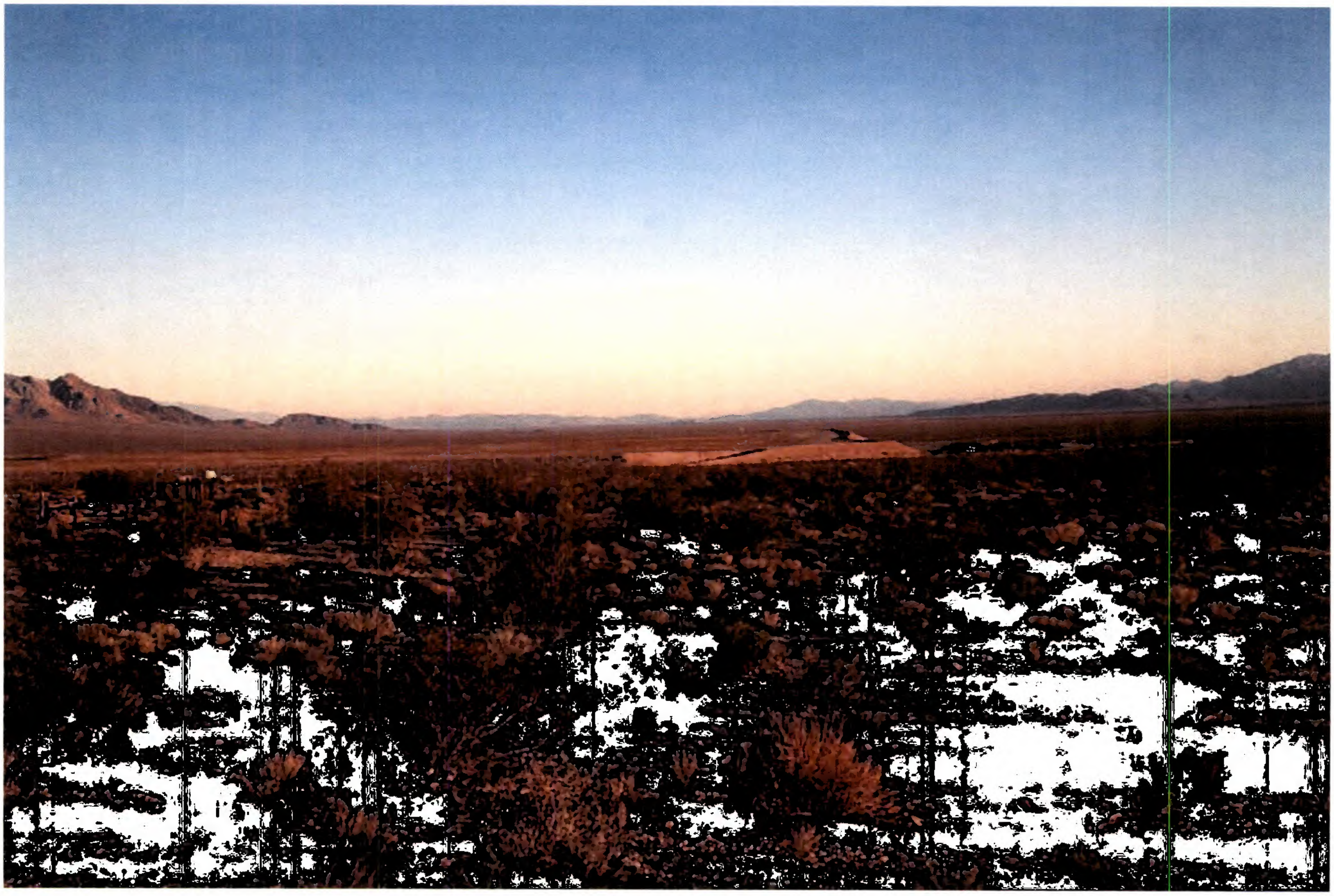
Degree of Contrast		Features: Landform/ Water Body				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X			X	
	Line				X				X			X	
	Color				X				X			X	
	Texture				X				X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	



KOP 14 – View facing east-southeast from Rhyolite Cemetery

Weak contrast would result from construction and operation of the proposed project with semi-modified (due to landfill) project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the modifications to landform and vegetation would be seen from this KOP. The proposed project structures would be seen from KOP 14 at a distance of 25 ½ miles and would be seen from a slightly-superior viewing position with partial obstructions from topography, further reducing the overall perceived impacts. Possible views of mirrors in the later afternoon may raise contrast level to low-moderate. Overall impacts are anticipated to be low.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

KOP 14 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

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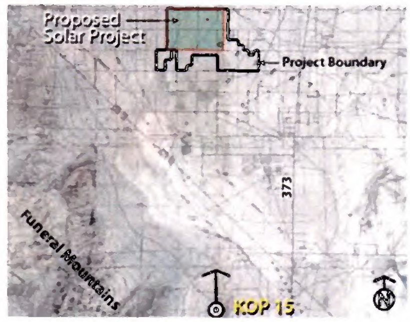
VISUAL CONTRAST RATING WORKSHEET

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

DRAFT

Project Name:	**Location**	Location Sketch
Amargosa Farm Road Solar Project	Township 26N	
Key Observation Point : 15 Funeral Mountains Wilderness	Range 4E	
VRM Class: IV	Section 7	

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground) Triangular, Irregular (background)	Low, horizontal (foreground and mid-ground)	None visible
Line	Horizontal (foreground) Undulating, irregular (background)	Regular (foreground to background)	None visible
Color	Tan (foreground and mid-ground) Dark Brown/brown, tan (background)	Browns, green, reddish-browns (foreground to background)	None visible
Texture	Fine (foreground) Medium to Coarse (background)	Fine (foreground to background)	None visible

Proposed Activity Description (Facility)

Facilities – Transmission Lines (tl), Solar Fields (sf), and Power Block (pb)

	Landform/Water	Vegetation	Structures
Form	Flat, Horizontal (sf, pb) (background)	Geometric from clearing (sf, pb) (background)	Linear, rectangular (sf), tall, cylindrical (pb) (background)
Line	Horizontal, linear (sf, pb), (background)	Regular, linear (sf, pb) (background)	Linear (sf) vertical (pb) (background)
Color	Light brown	Green/brown, reddish brown (background)	Silver-blue, shiny (sf) tan/brown (pb) (background)
Texture	Fine	Fine (background)	Fine (sf) medium (pb) (background)

Degree of Contrast

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X			X	
	Line				X			X				X	
	Color				X			X			X		
	Texture				X				X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
See Chapter 4 - Mitigation

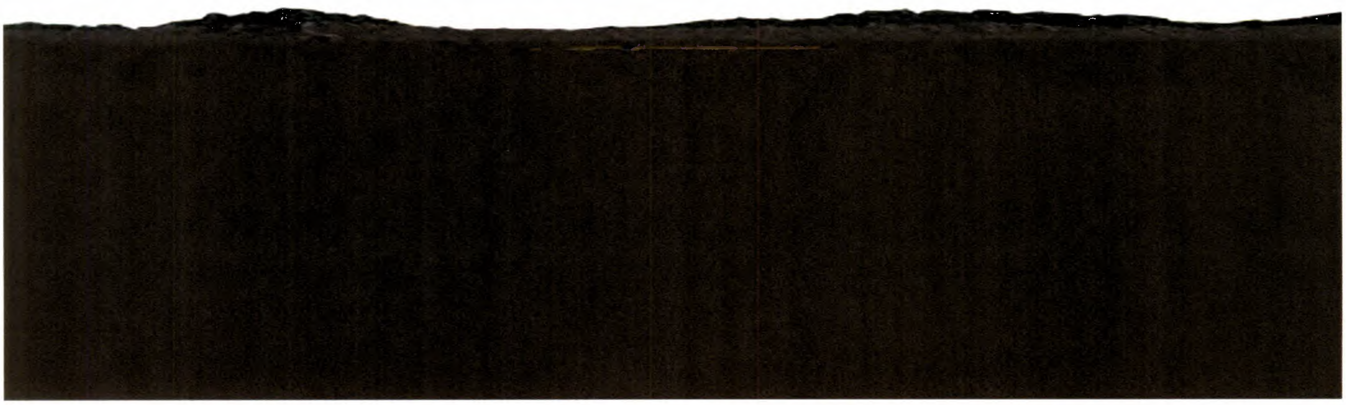
Evaluators Names:
Conrad Langley, Marc Schwartz

Date: December 2009	
District: Southern Nevada District	
Resource Area: Pahrump	
Activity (program): Solar Facilities	

KOP 15 – View facing south from Funeral Mountain Wilderness

Moderate contrast would result from construction and operation of the proposed project with moderately modified project setting designated as VRM Class IV. The construction of the project would result in substantial grading and the clearing of vegetation, but is unlikely that the contrast of modifications to landform and vegetation would result in increased project contrast from this vantage point. The proposed project structures would be seen from KOP 15 at a distance of 11 ½ miles and would be seen from a superior viewing position. From this KOP, the likelihood of mirrors reflecting the sky would be increased from mid-morning to mid-afternoon increasing the increased contrast in color. Solar collectors, power block components, and ancillary facilities would be seen increasing the contrast in the structure's form and line; however, the distance from the proposed project coupled with backdropped views, will reduce the overall perceived impacts. Overall impacts will be moderate.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities



KOP 15 – Wire Frame model of solar fields and project elements (does not account for vegetation screening or wind fence screening)

SCENIC QUALITY CONTRAST WORKSHEET

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

Project Name: Amargosa Farm Road Solar Project	**Property:**	
Photograph Location: Township 16S Range 49E Section 8	**Scenic Quality Classification:** A = 19 or more B = 12-18 C = 11 or less	

Existing Landscape:
Scenic Quality Classification Rating – C/7

Landform	5	4	3	2	**1**
Vegetation	5	4	3	2	**1**
Water	5	4	3	2	**0**
Color	5	4	3	**2**	1
Adj. Scenery	5	4	**3**	2	1
Scarcity	5	4	3	2	**1**
Cultural Modifications	2	1	0	**-1**	-2

Proposed Project:
Scenic Quality Classification Rating – C/4

Landform	5	4	3	2	**1**
Vegetation	5	4	3	2	**1**
Water	5	4	3	2	**0**
Color	5	4	3	2	**1**
Adj. Scenery	5	4	3	**2**	1
Scarcity	5	4	3	2	**1**
Cultural Modifications	2	1	0	-1	**-2**

Narrative Landscape Description:

Creosote flats – This flat landscape is common in the Mojave Desert, Basin and Range plains and consists of desertscrub plants – predominately creosote and burrobush. Due to the harsh growing conditions, vegetation is monotonous in form, texture, and scale and appears as a uniform plain. Alluvial fans coalesce in the Amargosa Valley, forcing the brief rain events into a sheetflow pattern with little evidence of water. The minor variety in color comes from the light soil contrasting with the year-round color of the creosote as it changes from green in the spring/summer to brown/green in the fall/winter and blooming yellow with white nodules in the spring. Adjacent scenery is of the irregular, organic Funeral Mountains ranging from the south to the west, the Yucca mountain range to the north, and the Spring Mountains to the east. Cultural modifications of the Amargosa Valley consists of disbursed pockets of residences and farm complexes spread throughout the valley.

Date: December 2009
District: Southern Nevada District
Resource Area: Pahrump
Activity (program): Solar Facilities

Photograph: View west from Sandy Lane

Appendix E

Conceptual Stormwater Control Plan

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CONCEPTUAL STORMWATER CONTROL PLAN

Amargosa Farm Road Solar Project
Nye County, Nevada

Job No.: SML0801.000
Date: December 2008

Prepared By:
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Mark J. Failla, P.E.
NV Professional Engineer No. 14566

Assisted By: Steve Jones, P.E.

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- Exhibit C – Existing Condition Offsite Drainage Map
- Exhibit D – Existing Onsite Condition Drainage Map
- Exhibit E – Proposed Condition Drainage Map
- Exhibit F – Flood Control Facilities Map – Perimeter Facilities
- Exhibit G – Flood Control Facilities Map – Onsite Facilities
- Exhibit H – Existing Condition HEC-RAS Cross Section Map

Appendix B: Conceptual Grading Plan & Typical Sections

Appendix C: Electronic Data CD

1 INTRODUCTION

1.1 Project Overview & Study Purpose

Solar Millennium, LLC is proposing to develop approximately 7,810 acres of property for utilization of solar power generation. Exhibit A included in Appendix A is a location map for the project and provides the limits of the property boundary. The initial phase of the project focuses on utilization of approximately 4,100 acres of the total 7,810 acres.

The purpose of this study is to provide a conceptual stormwater control plan for development of the initial 4,100 acres project site. More specifically this study provides the following:

- Summary of site research and data collection
- Discussion of FEMA floodzone impacts
- Discussion of local design requirements
- Summary of existing and proposed hydrologic analyses
- Summary of conceptual stormwater control facilities

This study is intended to provide only a conceptual stormwater plan for protection of the project site from onsite and offsite storm flows. As such, this study provides only a summary of results and conclusions and supporting hydrologic and hydraulic computations have been purposely omitted. This study is not suitable for submittal to Nye County in support of detailed grading and improvements plans and it is acknowledged that technical studies in support of future improvement plans will be required.

1.2 Site Description

The project site is located in Amargosa Valley, Nye County, Nevada approximately four miles southwest of the intersection of State Route 373 and U.S. Highway 95. Amargosa Farm Road (Farm Road) traverses the southern portion of the property in an east/west direction. Farm Road will be relocated as a part of this project along the frontage of the solar field in order to accommodate the modular layout of the field.

The project site is flat with an average 1-percent slope falling from northeast to southwest across the site. The site consists of desert shrub with numerous defined, intermittent and braided washes traversing in a southwesterly direction.

The project site is located with the watershed of the Forty-Mile Wash as determined by USGS quad maps and the USGS National Hydrography Data Set. The Forty-Mile Wash consists of an approximate 330 square mile drainage area measured to the southern property line of the project site. The section of the Forty-Mile Wash impacting the site is considered alluvial based on site field investigation and review of aerial photography. The apex of the Forty-Mile Wash is clearly identifiable approximately one-half mile north of Interstate 95.

1.3 FEMA Flood Zone Designation

The project site is currently located in a Federal Emergency Management Agency (FEMA) Zone X as depicted on the effective Flood Insurance Rate Map (FIRM) Panels 320018 4125C, 320018 4150C, 320018 4225 C and 320018 4250C dated September 28, 1990. A Zone X is defined by FEMA to be areas determined to be outside the 0.2% annual chance floodplain. Zone X designations are not regulated by FEMA. Exhibit B identifies the project site on the current effective FIRMs and has been included in Appendix A for reference.

The Forty-Mile Wash, north of U.S. Highway 95 is located within a FEMA designated Zone A Special Flood Hazard Area (SFHA). A Zone A SHFA is defined by FEMA to be areas subject to inundation by the 1% annual chance flood event, no base flood elevations determined. Zone A designations are regulated by FEMA. It is noted that although the portion of the Forty-Mile Wash located within the project site is not located within a FEMA Zone A, the site will clearly exhibit impacts due to flooding. As such, FEMA has no regulatory authority within the project site and it will not be required to submit any information to FEMA for development of the project area.

1.4 Regional Flood Control Master Plan

No regional flood control master plan exists for this area of Nye County.

2 METHODOLOGY

2.1 Compliance

The methodologies utilized in the preparation of this study are in compliance with the *Nye County Guidelines for Design and Review of Development Engineering Submissions, dated February* 2005, (Nye County Guidelines, Reference 1) and the *Clark County Regional Flood Control District's Hydrologic and Drainage Design Manual* (CCRFCD Manual, Reference 2). Per the Nye County Guidelines, the CCRFCD Manual is to be used for all methodologies not covered in the Nye County Guidelines.

2.2 Hydrologic Modeling

Modeling: The SCS Unit Hydrograph Method (SCS Method) within the U.S. Army Corp of Engineers HEC-1 Flood Hydrograph Package was utilized to determine peak flow rates. The SCS Method utilizes precipitation, drainage area, curve number and lag time parameters to determine peak flow rates.

Precipitation: Rainfall depths have been obtained from the NOAA Atlas 14 Precipitation Server. Six-hour precipitation values were obtained for the 10-year, 25-year and 100-year storm events for onsite basin analysis and 100-year only were obtained for offsite analysis. Precipitation values were obtained for the site and each individual offsite basin at the centroid of each area. Appropriate drainage area reduction factors (DARFs) referenced from the CCRFCD Manual have been applied to watersheds exceeding 0.5 square mile in area. The Storm Distribution No.3 (SDN 3) from Table 503

in the CCRFCD Manual was used for drainage areas less than 8 square miles. The SDN4 was used for drainage areas greater than 8 square miles and less than 12 square miles. The SDN5 was used for drainage areas greater than or equal to 12 square miles.

Curve Number: The SCS curve number loss rate methodology was utilized to approximate infiltration for the drainage subbasins. Soils data utilized for the hydrologic analyses presented in this study have been referenced from the NRCS Web Soil Survey and the NRCS Soil Data Mart websites. This survey delineates soil types and provides the Hydrological Soil Group (HSG) designation for each soil unit. Curve numbers (CN) were developed for the subbasins based upon existing and proposed condition land use.

Lag Time: The lag time is defined as the time measured from the center of mass of effective rainfall to the time to peak of the outflow hydrograph. The lag time is related to the time of concentration as 0.6 times the time of concentration.

The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a subbasin to the outlet point of the subbasin. Per the CCRFCD Manual, time of concentration (T_C) is a combination of an initial overland time (T_i), and travel time (T_t) in a ditch, channel, gutter, storm sewer, etc.

For offsite drainage areas larger than 1 square mile, the CCRFCD Manual recommends the use of a USBR derived equation to determine the lag time and was utilized for the hydrologic analyses. For onsite basins exceeding 1 square mile, lag times were determined utilizing methodologies from Section 602 of the CCRFCD Manual as they were determined to result in more reasonable results.

2.3 Hydraulic Modeling

Flood Control Facilities: Flood control facilities were conceptually sized and analyzed by normal depth methodologies utilizing the Flowmaster Version 7.0 software by Haestad Methods.

Flood Plain Analysis: The existing condition flood plain analysis was conceptually analyzed utilizing the HEC-RAS computer program by the U.S. Army of Engineers. It is noted that the HEC-RAS program may not be the most appropriate methodology to analyze the alluvial fan condition that impacts the site and that a more appropriate method such as Flo-2D may be required for future evaluation for the project.

3 EXISTING DRAINAGE CONDITION

3.1 Definition of Existing Condition

The existing condition considers the offsite and onsite land use and drainage patterns as they currently exist.

3.2 Discussion of Existing Condition

The contributing drainage area to the Forty-Mile Wash was determined to be approximately 330 square miles measured to the southern property boundary. Various subbasins were evaluated in order to determine peak flows rates in areas of interest. Exhibit C included in Appendix A identifies the offsite drainage areas utilized in the hydrologic evaluation.

Concentration points PT1, PT2 and PT3, as well as Subbasins SUB10 and SUB11 were created to determine existing condition peak flow rates at key locations along the southern property line. These locations have been utilized for comparison to the proposed condition peak flow rates at the same location in order to ensure that existing condition peak flows at the property boundary will not be exceeded by development of the project site. Exhibit D included in Appendix A identifies the onsite drainage areas utilized in the hydrologic evaluation.

In order to estimate the limits of the existing Forty-Mile Wash 100-year flood plain impacting the site a HEC-RAS hydraulic model was prepared. Exhibit H included in Appendix A depicts the estimated 100-year flood plain limits through the project site.

3.3 Summary of Existing Condition Flows

Exhibits C and D included in Appendix A provide a summary of peak 100-year flow rates determined for the existing condition drainage areas evaluated by this study. The following table provides a summary of peak 100-year flow rates determined at the key locations discussed above.

Table 1: Existing Condition Peak Flow at Key Locations

Subbasin/Concentration Point	Q_{100} (cfs)
PT1	9,596
PT2	129
PT3	262
SUB10	880
SUB11	482

4 PROPOSED DRAINAGE CONDITION

4.1 Definition of Proposed Condition

The proposed condition is identical to the existing condition with the exception that onsite areas were assessed with a developed land use, and drainage patterns were routed based on proposed conveyance facilities.

4.2 Discussion of Proposed Condition

The proposed condition was assessed in order to determine impacts due to development of the site and to support flood control facility design for protecting the project site. The general concept of the proposed conceptual stormwater control plan is to limit post-development peak flow rates to pre-development limits, and return the flow to the same location and in the same manner as the existing condition in accordance with Nevada Drainage Law.

Concentration points PT1, RPT2 and PT4, as well as Subbasins 789 and SUB11 were created to provide comparison to the same locations evaluated for the existing condition along the southern property line. Exhibit E included in Appendix A identifies the drainage areas utilized in the proposed condition hydrologic evaluation for use in facility design and for comparison to existing conditions.

In order to assess onsite drainage conditions and to determine onsite facility design, Subbasins SITEA, SITEB, SITEC and SITED were subdivided based on proposed drainage patterns. Peak 10, 25 and 100-year storm flows were pro-rated from the parent basin (i.e.: SITEA, SITEB, etc.) in order to determine onsite peak flow rates at key locations necessary for onsite facility design. Prorated Subbasins A-A, B-A, C-A, D-A, A-B, B-B, C-B, and D-B were created based on typical proposed onsite drainage patterns and have also been identified on Exhibit E.

4.3 Summary of Proposed Condition Flows

Exhibits E included in Appendix A provides a summary of peak 100-year flow rates determined for the proposed condition drainage areas evaluated by this study. The following table provides a summary of peak 100-year flow rates determined at the key locations discussed above.

Table 2: Proposed Condition Peak Flow at Key Locations

Subbasin/Concentration Point	Q_{100} (cfs)
PT1	9594
RPT2	121
PT4	846
SUB789	133
SUB11	482

The following table provides a comparative summary of the existing and proposed condition discharge flow values at equivalent locations.

Table 3: Comparison Summary – Existing Condition vs. Proposed Condition

Comparison Location (Existing/Proposed)	Existing Condition Flow Q_{100}	Proposed Condition Flow Q_{100}
PT1/PT1	9,596	9,594
PT2/RPT2	129	121
PT3/789	262	133
SUB10/PT4	880	846
SUB11/SUB11	482	482

Review of the table above indicates that post-development peak flowrates will be limited to pre-development conditions based on the proposed conceptual stormwater control plan.

5 CONCEPTUAL STORMWATER CONTROL FACILTITES

5.1 Alternatives Assessment

Various alternatives were considered in the assessment of protecting the project site from offsite storm flows. The alternative assessment generally considered feasibility, construction cost and community advantages. The following two alternatives were considered the most viable:

1. Provide a regional offsite detention basin at the apex of the Forty-Mile Wash located north of U.S. Highway 95: This alternative would effectively and considerably reduce existing condition peak storm flow downstream of U.S. Highway 95. This alternative would allow reduction in size of perimeter flood control facilities necessary for protection of the project site. Additionally, this alternative would benefit all properties downstream of the detention basin. Since this alternative requires the detention basin to be located at the apex of the Forty-Mile Wash, the primary negative is that the detention basin would be located outside of the current BLM Land Grant request area.

2. Provide 100% interception and conveyance for the entire existing condition flow from the Forty-Mile Wash: This alternative would provide site perimeter flood control facilities with sufficient capacity to intercept and convey the peak 100-year storm event flow from the Forty-Mile Wash. This alternative is considered more expensive than Alternative No. 1; however it would be entirely located on the subject project and not reliant on offsite property.

Although Alternative No.1 appears to be a viable and financially more attractive choice; for purposes of this study, Alternative No.2 was selected due to the fact that it is within the current site boundary. As the project progresses it is likely that Alternative No.1 will be pursued with Nye County and BLM further.

5.2 Offsite Runoff – Stormwater Control Facilities

As discussed above and for purposes of this study, Alternative No. 2 was selected to intercept and convey offsite flow. In general, the protection of the property from the Forty-Mile Wash will be provided by means of a continuous concrete lined channel around the northern and western perimeter of the site. The channel has been designed to effectively intercept the 100-year storm event offsite runoff and convey the concentrated flow to the southwest corner of the property. The southwest corner of the property has been identified as the historic discharge location of the Forty-Mile Wash (Concentration Point PT1). The channel will discharge within the property limits and energy dissipation facilities will be provided in order to disperse the concentrated flow back to a shallow sheet flow condition prior to leaving the property boundary. As discussed in Section 4.3, the flow will be returned to the Forty-Mile Wash in the historic quantity, location and manner in accordance with Nevada Drainage Law.

Additionally, a concrete lined channel is proposed along the eastern side of the solar field in order to intercept and collect flows impacting the Phase 1 development from the east. Similar to the Forty-Mile Wash channel, the concentrated flow will be released on property in its historic location (Concentration Point PT4) and an energy dissipation facility will be provided in order to return the flow to a shallow sheet flow condition prior to leaving the property. The flow will be returned in the historic quantity, location and manner in accordance with Nevada Drainage Law.

Perimeter channels are recommended to be concrete lined due to the high velocity potential and for maintenance reasons.

Exhibit F, included in Appendix A, provides the locations, design flows, design slopes and facility geometry for the conceptual perimeter facilities considered necessary to protect the site from offsite storm flows.

5.3 Onsite Runoff – Stormwater Control Facilities

Due to the size of the solar field area, the site itself has potential to generate large storm flows during a rain event. For this reason, onsite stormwater control facilities are necessary to protect onsite facilities, and to convey stormwater runoff to historic discharge locations in both quantity and manner of flow.

In order to assess onsite facilities, the solar field project area was divided into four typical quadrants identified as SITEA, SITEB, SITEC and SITED (see Exhibit E). Each quadrant is assumed to have equivalent storm flow and facility designs. The general concept is that each quadrant will consist of a series of open channel facilities (Minor Channels) intercepting and conveying stormwater runoff to a concrete lined channel facility (Major Channels) located along the west side of each quadrant. Each of the four Major Channels is designed to intercept and convey the 100-year storm event design

flow from each section. All Minor Channels within each section are designed to intercept and convey the 25-year storm event to the Major Channels. This concept was selected in order to reduce costs for onsite drainage facilities, while still providing desired flood protection. All Major Channels are recommended as concrete lined for purposes of reliability and maintenance.

Exhibit G, included in Appendix A, provides the locations, design flows, design slopes and facility geometry for the conceptual onsite facilities considered necessary to protect the site from storm flows.

In addition to onsite channel facilities, an onsite detention basin is considered necessary in order to limit post-development flows at Concentration Point PT2 to pre-development limits. The onsite detention basin facility location and size is indicated on Exhibit G.

As a result of the anticipated re-alignment of Amargosa Farm Road along the southern boundary of the solar field area, numerous underground culvert facilities will be necessary to convey storm flow from the onsite open channel facilities below the roadway. The locations of the culvert facilities have been located on Exhibit G.

6 CONCLUSION

The hydrologic and hydraulic analyses, and the stormwater control facilities presented in this study are considered conceptual. Detailed technical analyses will be required in support of future grading and improvement plans as required by Nye County.

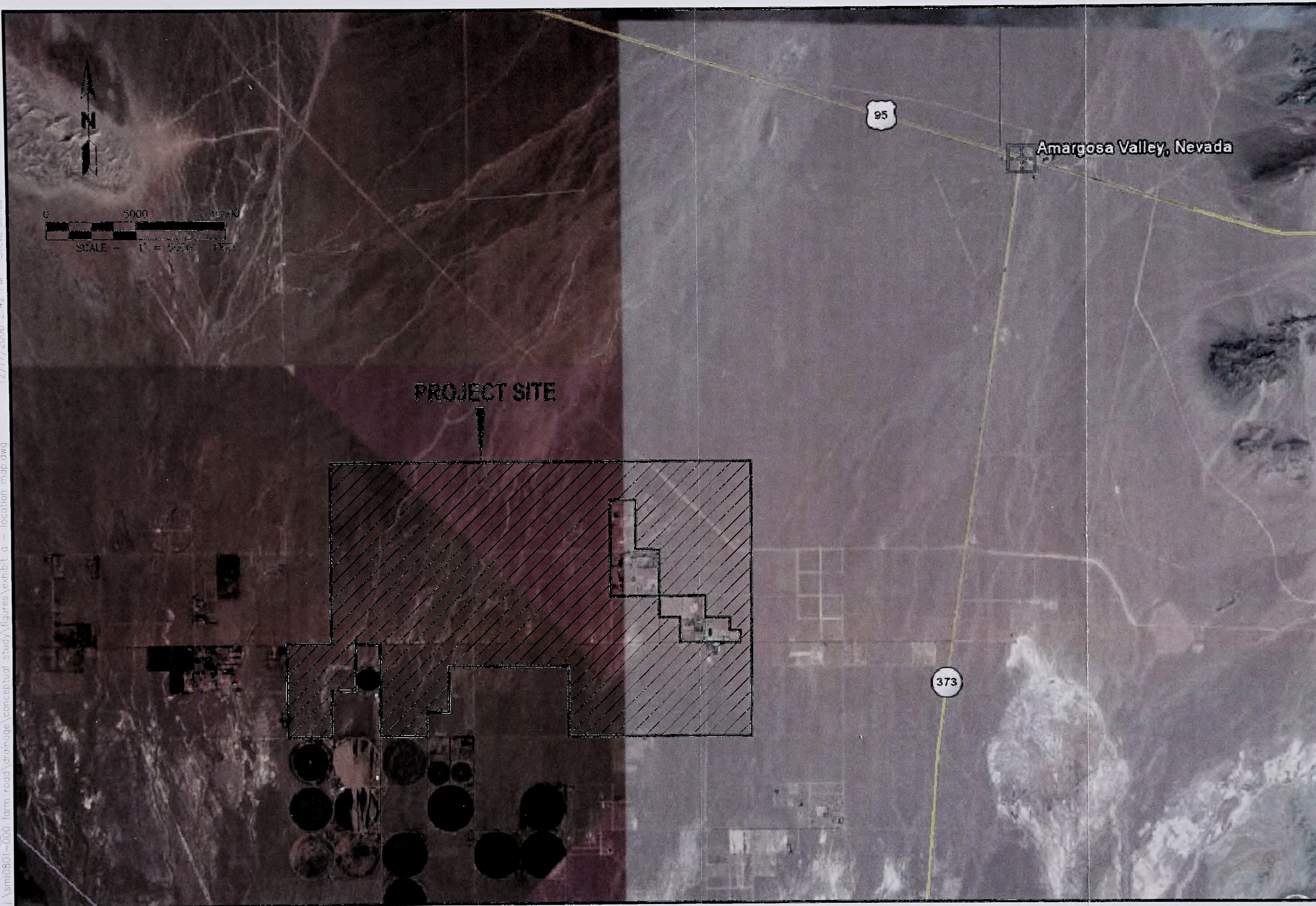
The conceptual stormwater control facilities presented in this study provide a design in accordance with Nevada Drainage Law. More specifically, the design presents a drainage concept that returns offsite and onsite developed flow to historic locations in both quantity and manner, thus not resulting in any adverse impacts to downstream property owners.

A conceptual grading plan and typical drainage channel sections have been included in Appendix B.

7 REFERENCES

1. *Hydrologic Criteria and Drainage Design Manual.* Clark County Regional Flood Control District, 1990.

2. *Guidelines for Design and Review of Development Engineering Submissions*, February 2005, Nye County Department of Public Works.



SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118

NO.	DESCRIPTION	DATE	BY	APP DATE	APP

SOLAR MILENNIUM, LLC
AMARGOSA FARM ROAD SOLAR PROJECT
LOCATION MAP

DATE: 11/17/08
DRAFTER: SMJ
DESIGNER: SMJ
CHECKED: MJF
PROJECT NO.
SML0801.000
EXHIBIT A
SHEET 1 OF 1

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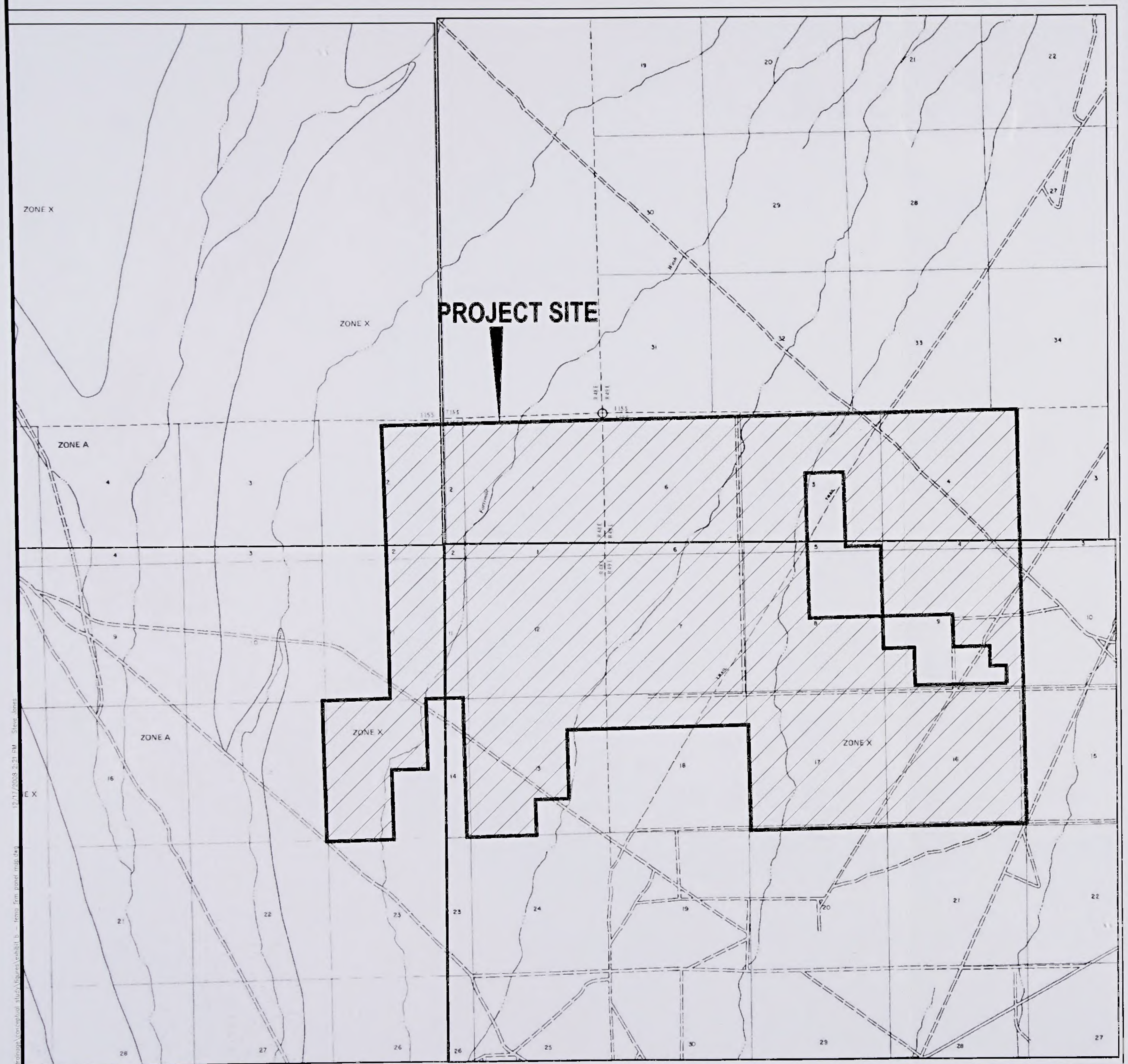

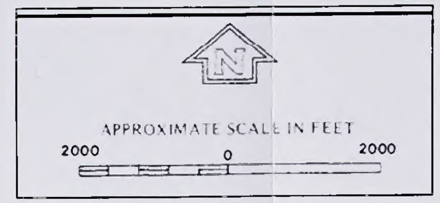

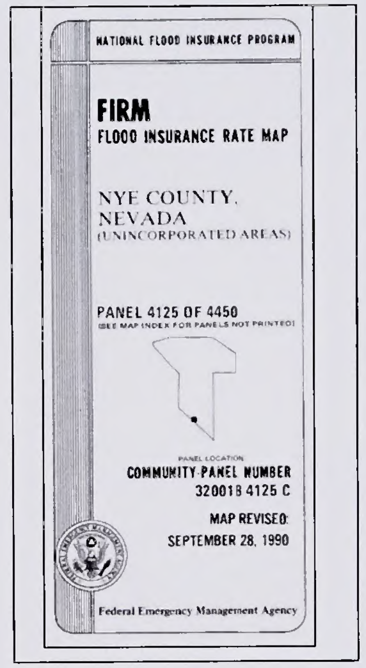

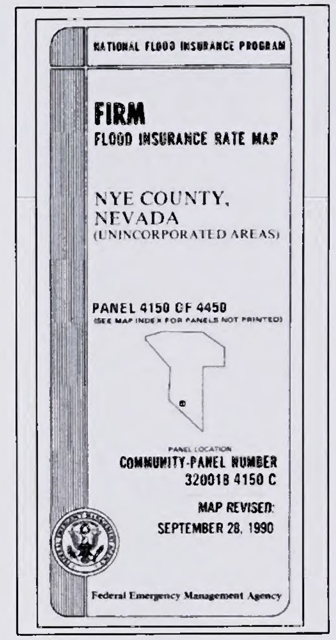

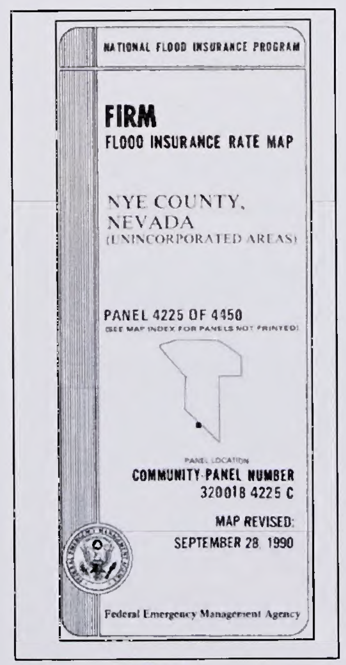

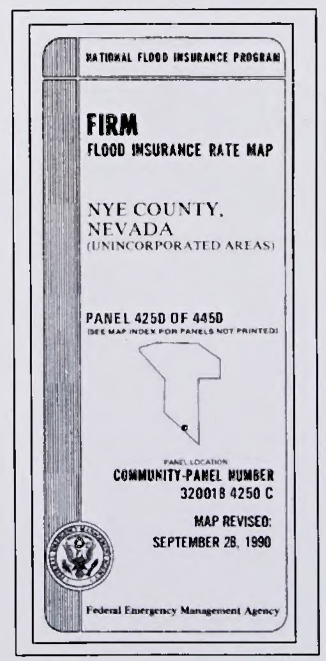

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SOLAR MILENNIUM, LLC
AMARGOSA FARM ROAD SOLAR PROJECT
FEMA FIRM PANEL MAP

DATE: 11/17/08
DRAFTER: SMJ
DESIGNER: SMJ
CHECKED: MJF
PROJECT NO.
SML0801-000

EXHIBIT B
SHEET 1 OF 1

HEC-1 Summary Existing Offsite Conditions		
Basin ID / Concentration Point	Area (sq. mi)	Q_{100} (cfs)
MESA[2]	165.26	12023
CNYN[2]	151.68	10412
SUB3[2]	12.47	621
SUB8[1]	3.58	262
SUB10[2]	14.09	869
CPFM[2] = MESA + CNYN	N/A	9605
PT1[2] = CPFM + SUB3	N/A	9596
1 - Flow obtained from SDN3 Storm Distribution		
2 - Flow obtained from SDN6 Storm Distribution		

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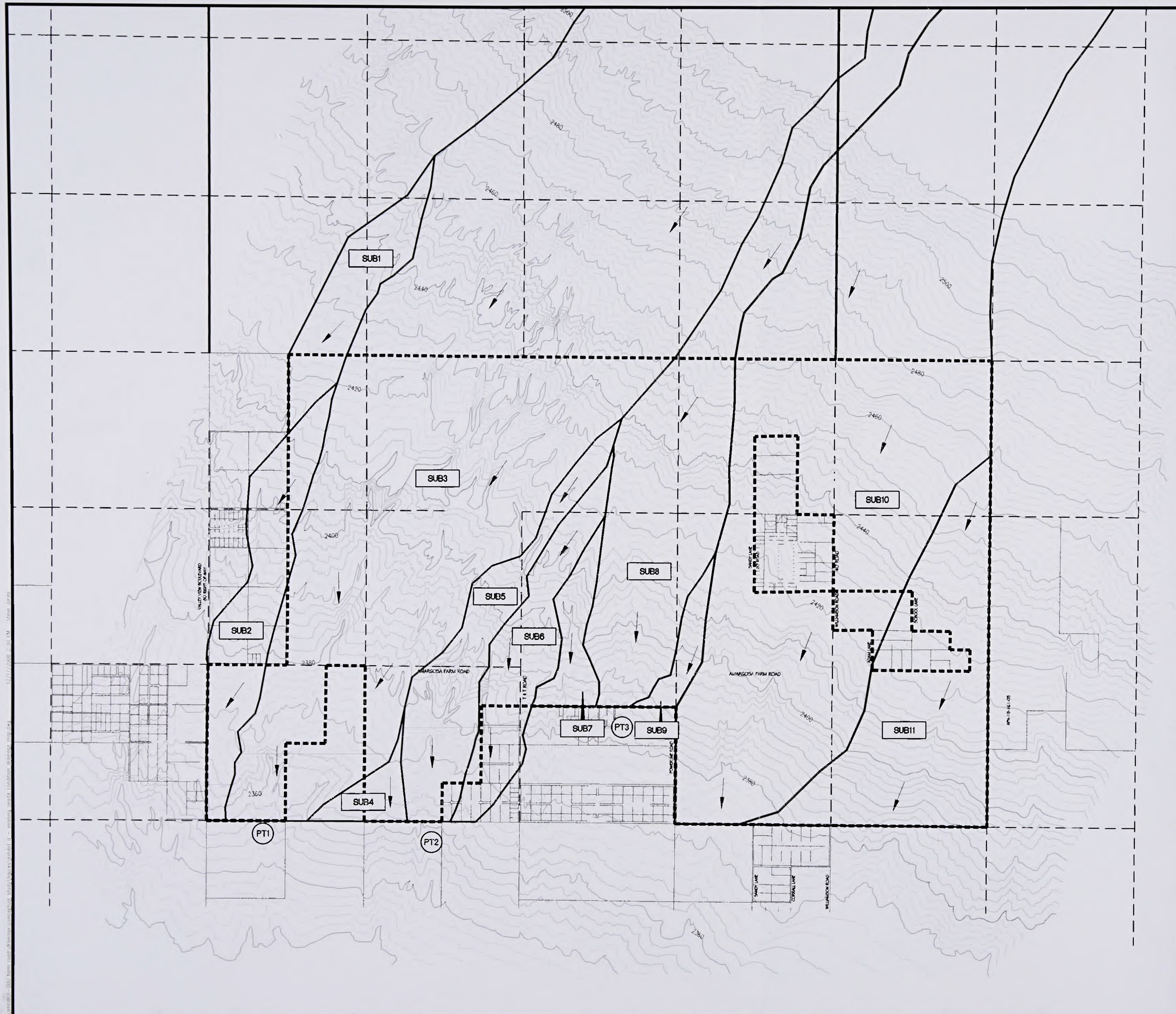
NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SOLAR MILLENNIUM, LLC
AMARGOSA FARM ROAD SOLAR PROJECT
EXISTING CONDITION OFFSITE DRAINAGE MAP

DATE: 11/26/08
DRAFTER: SMJ
DESIGNER: SMJ
CHECKED: MJF
PROJECT NO.
SML0861.000

EXHIBIT C
SHEET 1 OF 1



0 1500 3000
SCALE 1" = 1500' FEET

LEGEND

BASIN BOUNDARY

SUB1 BASIN ID

PT1 CONCENTRATION POINT

FLOW ARROW

SITE BOUNDARY

HEC-1 Summary
Existing Onsite Conditions

Basin ID / Concentration Point	Area (sq. mi)	Q_{100} (cfs)
SUB1[1]	0.49	54
SUB2[1]	0.77	67
SUB3[2]	12.47	621
SUB4[1]	0.16	27
SUB5[1]	0.76	70
SUB6[1]	0.66	64
SUB7[1]	0.25	34
SUB8[1]	3.29	241
SUB9[1]	0.15	24
SUB10[2]	14.38	880
SUB11[1]	1.62	482
PT1[2] = *CPFM + SUB3*	N/A	9596
PT2[1] = *SUB5 + SUB6*	N/A	129
PT3[1] = *SUB7 + SUB8 + SUB9*	N/A	262

1 - Flow obtained from SDN3 Storm Distribution.
2 - Flow obtained from SDN5 Storm Distribution.

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NO	DESCRIPTION	DATE	BY	APP DATE	APP

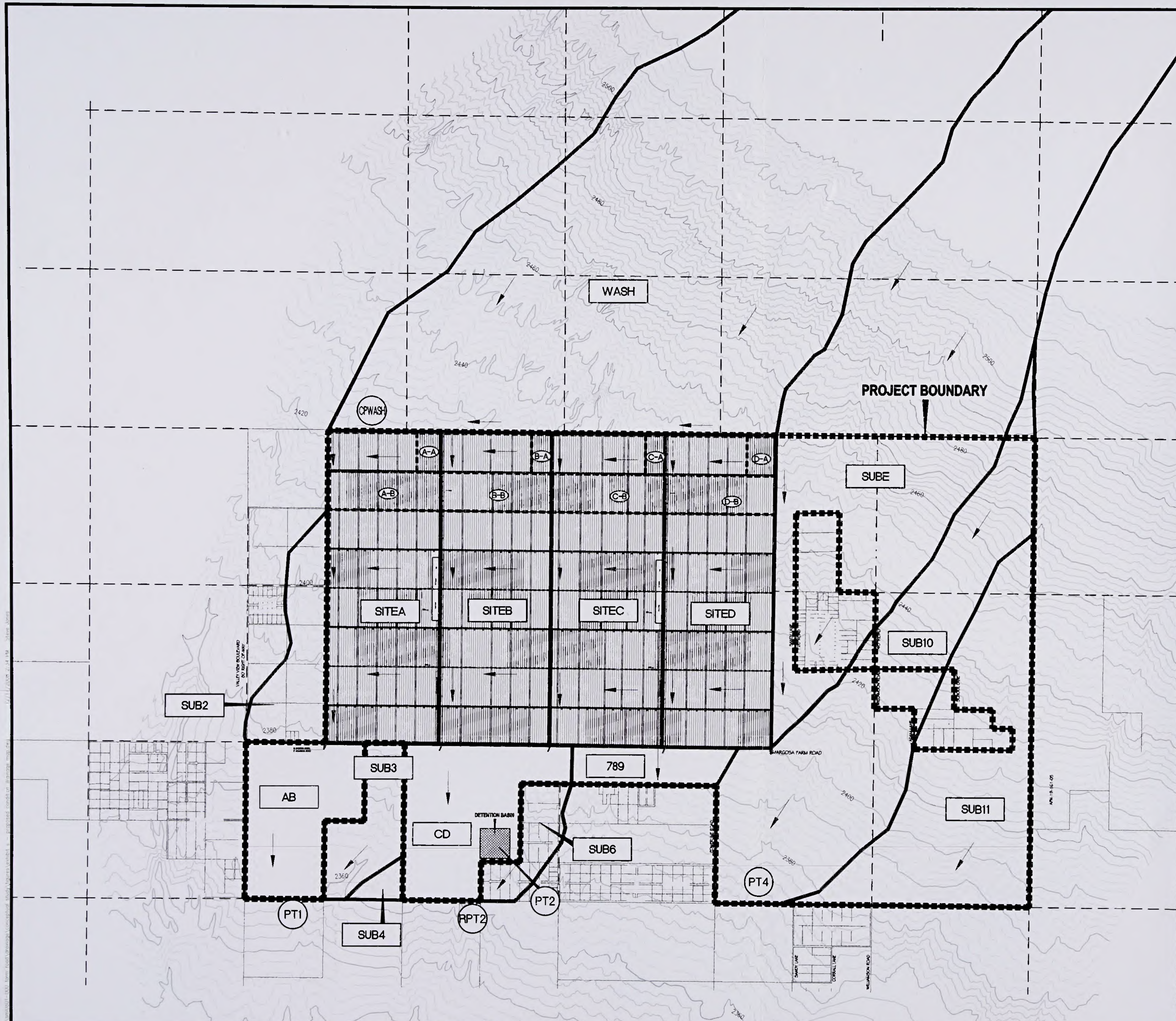
SOLAR MILLENNIUM, LLC

AMARGOSA FARM ROAD SOLAR PROJECT

EXISTING ONSITE CONDITION DRAINAGE MAP

DATE: 11/27/08
DRAFTER: SMJ
DESIGNER: SMJ
CHECKED: MJF
PROJECT NO.
SML0801.000

EXHIBIT D
SHEET 1 OF 1



N

0 1500 3000
SCALE = 1" = 1500' FEET

LEGEND

(thick line)	BASIN BOUNDARY
SITEA	BASIN ID
(dashed line)	PRORATED AREA BOUNDARY
A-A	PRORATED AREA ID
PT1	CONCENTRATION POINT
(arrow)	FLOW ARROW

HEC-1 Summary
Proposed Conditions

Basin ID / Concentration Point	Area (sq. mi)	Q_{100} (cfs)
SITEA[1]	1.42	387
SITEB[1]	1.41	384
SITEC[1]	1.44	390
SITED[1]	1.42	415
AB[1]	0.63	266
CD[1]	0.76	287
789[1]	0.24	133
WASH[2]	10.79	639
SUBE[3]	12.12	771
SUB2[1]	0.44	50
SUB3[1]	0.32	51
SUB4[1]	0.06	11
SUB6[1]	0.22	36
SUB10[1]	2.26	358
SUB11[1]	1.62	482
CPWASH[3] *= CPFM + WASH*	N/A	9594
PT1[3] *= CPWASH + SITEA + SITEB + AB + SUB2 + SUB3*	N/A	9594
PT2[1] *= SITEC + SITED + CD + SUB6*	N/A	980
RPT2[1] *= PT2 ROUTED THROUGH DETENTION*	N/A	121
PT4[3] *= SUBE + SUB10*	N/A	846

1 - Flow obtained from SDN3 Storm Distribution
2 - Flow obtained from SDN4 Storm Distribution
3 - Flow obtained from SDN5 Storm Distribution

HEC-1 Summary
Onsite Prorated Areas

Basin ID	Area (acres)	Q_{100} (cfs)	Q_{25} (cfs)	Q_{10} (cfs)
A-A	24.8	25	12	6
B-A	112.4	21	10	5
C-A	21.4	21	10	5
D-A	111.5	33	17	9
A-B	20.3	87	42	22
B-B	113.1	87	42	22
C-B	31.3	87	42	22
D-B	112.1	93	47	26

NOTES

BASIN "WASH" COMBINES THE OFFSITE AREAS DOWNSTREAM OF CONCENTRATION POINT CPFM, SHOWN IN EXISTING CONDITION AS BASINS "SUB1", "SUB3" AND "SUB8".

BASIN AREAS CONTRIBUTING TO CONCENTRATION POINT PT4 EQUAL EXISTING CONDITION BASIN "SUB10".

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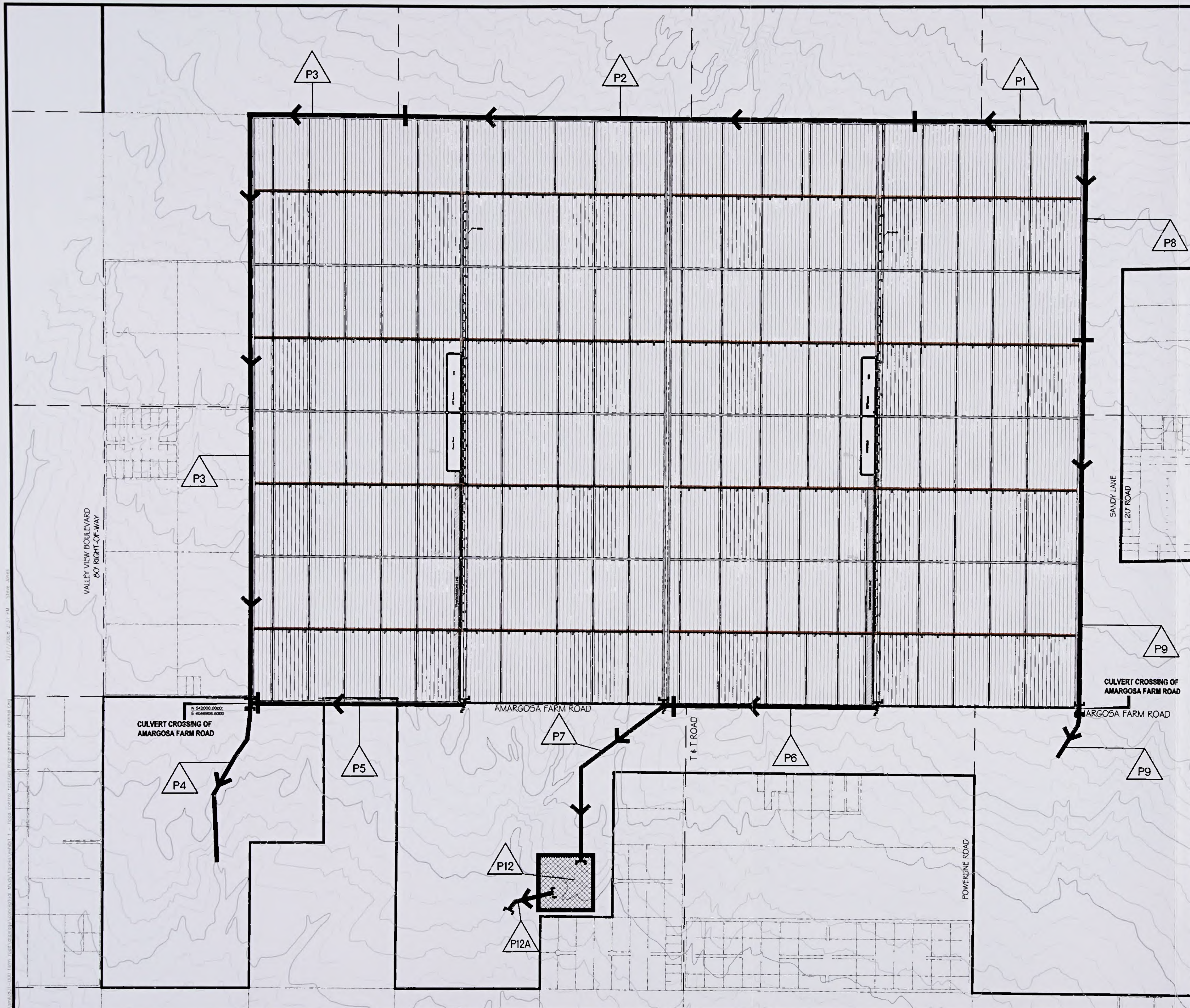
NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SOLAR MILLENNIUM, LLC
AMARGOSA FARM ROAD SOLAR PROJECT
PROPOSED CONDITION DRAINAGE MAP

DATE: 11/28/08
DRAFTER: SMJ
DESIGNER: SMJ
CHECKED: MJF
PROJECT NO.
SML0801.000

EXHIBIT E
SHEET 1 OF 1



N

0 800 1600
SCALE - 1" = 800' FEET

LEGEND

PROPOSED FACILITY AND FLOW DIRECTION

LOCATION OF FACILITY TRANSITION

HEADWALL CAPTURE FROM OPEN CHANNEL TO CLOSED CONDUIT

P1 FLOOD CONTROL FACILITY ID

Flood Protection Facility Summary - Perimeter Facilities

ID	Facility	Q_{design} (cfs)	Design Slope (%)	HEC-1 Node	Description
P1	Open Channel	3186	0.30	1/3(CPWASH)	Concrete Lined Trap. Channel, 14-ft Bottom Width, 9-ft Depth, 2:1 SS
P2	Open Channel	6398	0.30	2/3(CPWASH)	Concrete Lined Trap. Channel, 35-ft Bottom Width, 9-ft Depth, 2:1 SS
P3	Open Channel	9594	0.30	CPWASH	Concrete Lined Trap. Channel, 55-ft Bottom Width, 9-ft Depth, 2:1 SS
P4	Open Channel	9594	0.30	PT1	Concrete Lined Trap. Channel, 55-ft Bottom Width, 9-ft Depth, 2:1 SS
P5	Storm Drain	400	0.50	SITEB	8-ft wide by 5-ft high RCB
P6	Storm Drain	400	0.50	SITEC	8-ft wide by 5-ft high RCB
P7	Storm Drain	800	0.50	SITEC + SITED	11-ft wide by 6-ft high RCB
P8	Open Channel	10	0.50	N/A	Concrete Lined Trap. Channel, 10-ft Bottom Width, 1-ft Depth, 2:1 SS
P9	Open Channel	771	0.50	SUBE	Concrete Lined Trap. Channel, 10-ft Bottom Width, 5-ft Depth, 2:1 SS
P12	Detention Basin	IN=980 OUT=121	N/A	PT2	Volume = 122 ac-ft, Outlet Facility = 48-inch RCP
P12A	Storm Drain	121	0.50	RPT2	54-inch RCP

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SOLAR MILENNIUM, LLC

AMARGOSA FARM ROAD SOLAR PROJECT

FLOOD CONTROL FACILITIES MAP - PERIMETER FACILITIES

DATE: 12/03/08

DRAFTER: SMJ

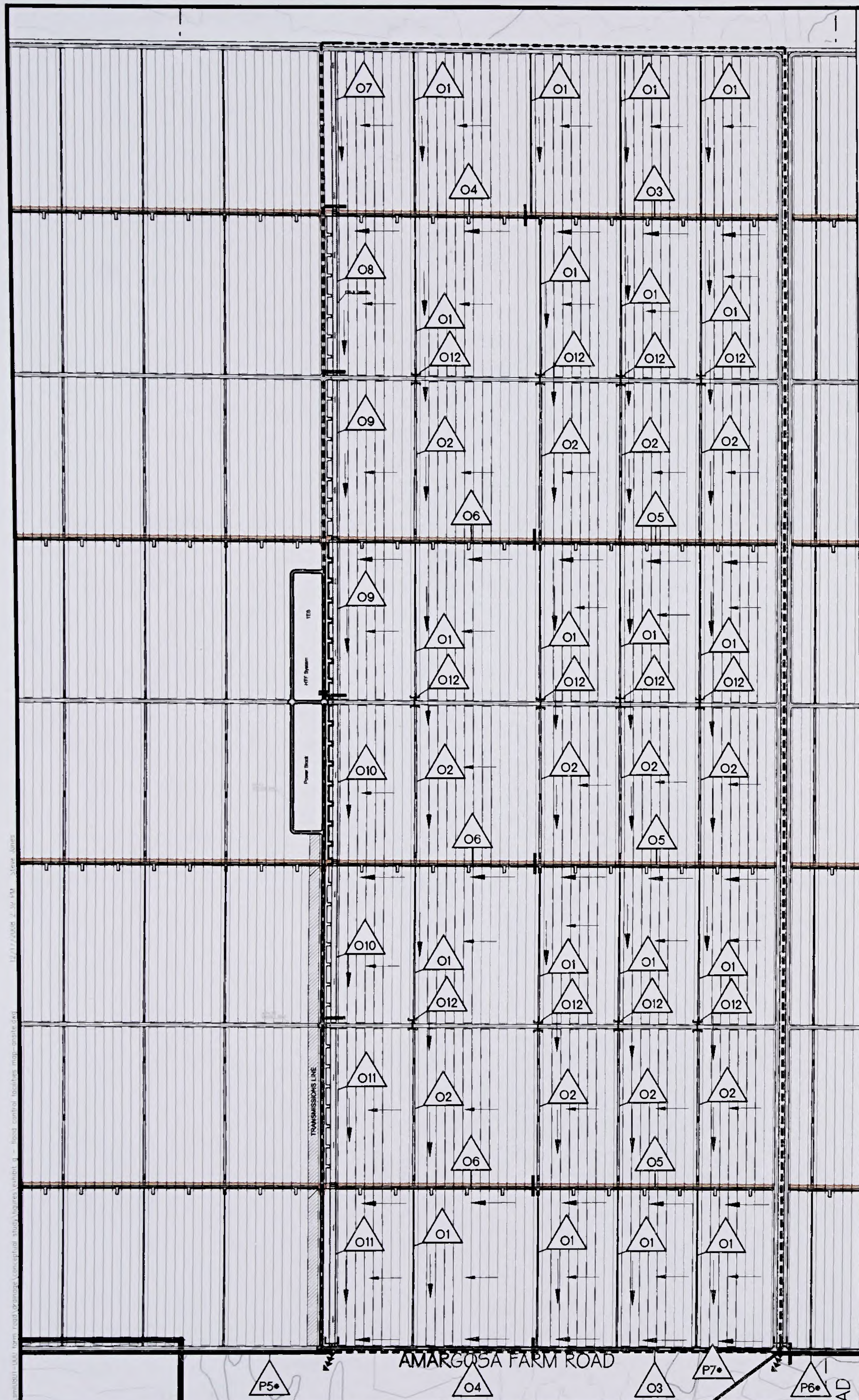
DESIGNER: SMJ

CHECKED: MJF

PROJECT NO.
SML0801.000

EXHIBIT F

SHEET 1 OF 1



NOTE THE ONSITE FACILITIES SHOWN ON THIS FIGURE ARE TYPICAL FOR EACH QUADRANT OF THE PROPOSED SITE.

N

0 500 1000
SCALE – 1" = 500' FEET

LEGEND

QUADRANT BOUNDARY

FLOOD CONTROL FACILITY ID

LOCATION OF FACILITY TRANSITION

FLOW DIRECTION ARROW

Flood Protection Facility Summary - Onsite Facilities

ID	Facility	Q_{DESIGN} (cfs)	Design Slope (%)	HEC-1 Node	Description
O1	Open Channel	10 (Q_{25})	0.50	B-A	Trap. Channel, 2-ft Bottom Width, 1-ft Depth, 3:1 SS, D_{50}=4-inch Riprap Lined Flowline
O2	Open Channel	20 (Q_{25})	0.50	2(B-A)	Trap. Channel, 5-ft Bottom Width, 1-ft Depth, 3:1 SS, D_{50}=4-inch Riprap Lined Flowline
O3	Open Channel	30 (Q_{25})	0.50	3(B-A)	Trap. Channel, 4-ft Bottom Width, 1.5-ft Depth, 3:1 SS, D_{50}=4-inch Riprap Lined Flowline
O4	Open Channel	40 (Q_{25})	0.50	4(B-A)	Trap. Channel, 4-ft Bottom Width, 1.5-ft Depth, 3:1 SS, D_{50}=4-inch Riprap Lined Flowline
O5	Open Channel	60 (Q_{25})	0.50	6(B-A)	Trap. Channel, 5-ft Bottom Width, 2-ft Depth, 3:1 SS, D_{50}=4-inch Riprap Lined Flowline
O6	Open Channel	80 (Q_{25})	0.50	8(B-A)	Trap. Channel, 5-ft Bottom Width, 2-ft Depth, 3:1 SS, D_{50}=4-inch Riprap Lined Flowline
O7	Open Channel	50 (Q_{100})	0.50	B-B	Concrete Lined Trap. Channel, 6-ft Bottom Width, 3-ft Depth, 2:1 SS
O8	Open Channel	100 (Q_{100})	0.50	2(B-B)	Concrete Lined Trap. Channel, 8-ft Bottom Width, 3.5-ft Depth, 2:1 SS
O9	Open Channel	200 (Q_{100})	0.50	4(B-B)	Concrete Lined Trap. Channel, 8-ft Bottom Width, 3.5-ft Depth, 2:1 SS
O10	Open Channel	300 (Q_{100})	0.50	6(B-B)	Concrete Lined Trap. Channel, 8-ft Bottom Width, 4.5-ft Depth, 2:1 SS
O11	Open Channel	400 (Q_{100})	0.50	SITEB	Concrete Lined Trap. Channel, 8-ft Bottom Width, 4.5-ft Depth, 2:1 SS
O12	Culvert	10 (Q_{25})	0.50	B-A	24-inch RCP with Headwall

*** - SEE EXHIBIT H FOR SUMMARY OF PAERIMETER FACILITIES: P5, P6 AND P7**

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

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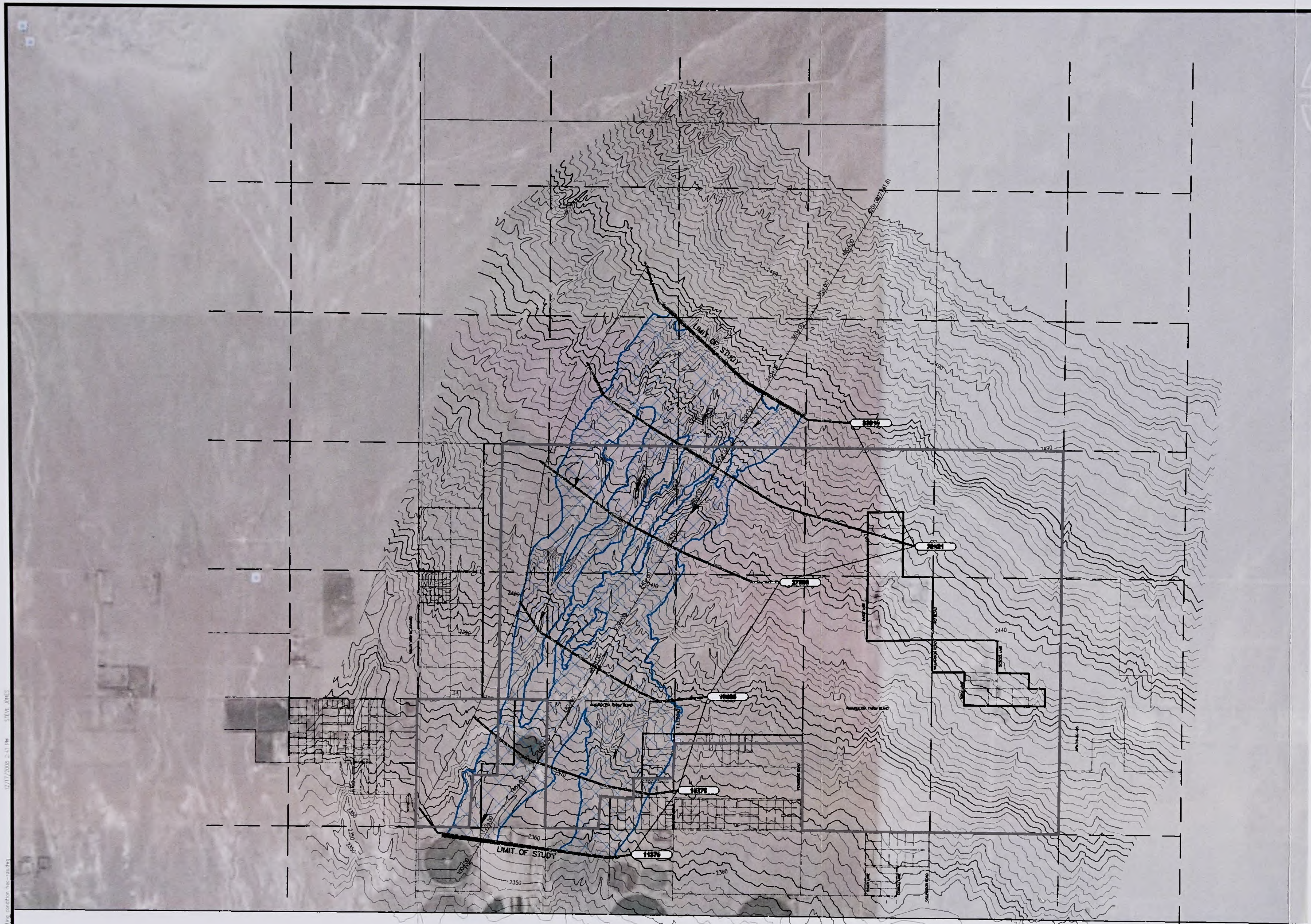
AMARGOSA FARM ROAD SOLAR PROJECT

FLOOD CONTROL FACILITIES MAP - ONSITE FACILITIES

DATE: 12/03/08
DRAFTER: SMJ
DESIGNER: SMJ
CHECKED: MJF
PROJECT NO.
SML0801.000

EXHIBIT G
SHEET 1 OF 1



N

0 2000 4000
SCALE - 1"=2000' FEET

SYMBOL KEY

- 4500 — HEC-RAS X-SECTION
- FLOW DIRECTION
- 100-YEAR WSE BOUNDARY
- SITE BOUNDARY

EXISTING CONDITION HEC-RAS SUMMARY TABLE						
HEC-RAS Station	Q_{100} (cfs)	Min. Chl elev. (ft)	W.S. E. (ft)	Max Chl Depth (ft)	Velocity (ft/s)	Froude Number
11370	10138	2354.57	2356.80	2.23	2.0	0.34
15270	10138	2368.00	2370.30	2.30	1.9	0.34
19885	10138	2388.00	2390.66	2.66	2.1	0.41
27550	10138	2412.52	2417.00	4.48	2.6	0.38
29521	10138	2435.46	2437.49	2.03	2.9	0.49
33910	10138	2457.84	2460.48	2.64	2.4	0.44

HEC-RAS Plan: SML0801-000
Reach: Reach #1 Profile: PF 1

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NO	DESCRIPTION	DATE	BY	APP

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AMARGOSA FARM ROAD SOLAR PROJECT

EXISTING CONDITION HEC-RAS CROSS SECTION MAP

DATE: 12/12/08
DRAFTER: CK
DESIGNER: CK
CHECKED: MJF

PROJECT NO.
SML0801.000

EXHIBIT H
SHEET 1 OF 1

GENERAL NOTE:
INTERIOR CHANNEL SECTIONS ARE TYPICAL WITHIN EACH OF THE FOUR QUADRANTS OF THE SITE BOUND BY THE FOUR MAJOR NORTH/SOUTH CONCRETE LINED CHANNELS.

Site Volume Table Unadjusted

Site	Stratum	Surf1	Surf2	Cut CY	Fill CY	Net CY	Method
-3.5 TO BALANCE							
	ew 081216 -3.5ft	eg 081216	fg prelim081216 -3.5ft to balance	11224012	9502150	1721862 (C)	Grid

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SOLAR MILENNIUM, LLC.

AMARGOSA FARM ROAD SOLAR PROJECT

CONCEPTUAL GRADING PLAN

DATE: 12-17-08
DRAFTER: NL
DESIGNER: NL
CHECKED: BDP
PROJECT NO.
SML0801.000

CG-1
SHEET 1 OF 2

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